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OPERATIONAL SPECIFICATION FOR COMPUTER
DIRECTED TRAINING IN INTERMEDIATE QUERY
LANGUAGE, MODEL II, FOR SYSTEM 473L,
U. S. AIR FORCE HEADQUARTERS

Doris J. Clapp
Harris H. Shettel
Sylvia R. Mayer

February 1966

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UNITED STATES AIR FORCE
L. G. Hanscom Field, Bedford, Massachusetts

Project 7682, Task 768204

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FOREWORD


One of the research goals of the Decision Sciences Laboratory, Electronic Systems Division, is the development of design principles for automated training subsystems which could be built into future Information Systems. Task 768204, Automated Training for Information Systems, under Project 7682, Man-Computer Information Processing, was established to develop a technology for these training subsystems.


This report is one in a series supporting Project 7682, Task 768204. The study was undertaken by the Decision Sciences Laboratory in support of the 473L System Program Office. Dr. Sylvia R. Mayer of the Decision Sciences Laboratory served as Air Force Task Scientist and contract monitor.

This operational specification was developed under Contract No. AF 19(628)-2935 with the American Institutes for Research by Mr. Harris H. Shettel, principal investigator, and Mrs. Doris J. Clapp, project director. Technical advice to ensure the development of the operational specification in accordance with approved 473L standards was provided by Dr. W. F. Bennett, Mr. M. L. Chenevert and Mr. J. Schiff of the Federal Systems Division of International Business Machines, Inc., under separate contract to the Electronic Systems Division.

The general technical guidance and support provided by Lt. Colonel Wood Ellis and Lt. Colonel Sam Slaughter of the USAF Command Post are gratefully acknowledged. Helpful contributions to the training design were made by Lt. Colonel Wood Ellis, Dr. Sylvia R. Mayer, and Mr. Jack Schiff and Mr. M. L. Chenevert.

This Technical Report has been reviewed and is approved.


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Colonel, USAF
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ABSTRACT

This Operational Specification describes the projected Computer Directed Training program which permits active on-console training of personnel in the writing and processing of Intermediate Query Language, Model II, statements in System 473L. This capability can be used to provide initial training and proficiency maintenance. The files, programs, and processes of the program and a model computer-trainee interaction are detailed. General flow charts for a possible computer program implementing the specifications are provided, designed for the Librascope L-3055. The capability can be adapted to provide training in the use of other System 473L capabilities.

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Section I

INTRODUCTION

1.1 Capability Utility

This document is a support capability operational specification that describes a capability for training System 473L users in Intermediate Query Language, Model II.¹ The purpose of this document is to specify the training design and the necessary operating procedures for this capability. In specifying these requirements, narrative explanatory materials, tables, figures (Training Sequence Logic Flow Diagram, Procedural Flow Diagram, cue and print-out formats), and operational examples are included in order to achieve the level of detail that is necessary to permit an assessment of feasibility by the potential user, and to permit subsequent programming, if this is desired.

A description of the scope of programming required for the implementation of this capability, and the effect it will have on other System 473L capabilities will be submitted in a report prepared by IBM under a separate contract.

Major new terms, unique to this capability, are defined in Appendix B.

1.1.1 Support Role

System 473L is designed primarily for operational use to permit Air Staff personnel to solve emergency resource-management problems. However, to ensure that Air Staff personnel are proficient in the operational use of this system, System 473L also has a support role, training.

The computer directed training capability set forth in this operational specification is designed specifically to use the 473L System itself to effectively and efficiently train Air Staff personnel in the use of Intermediate Query Language (QL), Model II. The teaching of QL is of vital importance, since the language is designed to support emergency requirements for information retrieval from the 473L System. QL is also used as a means of data retrieval by all System 473L operational capability programs. A further, potentially significant advantage of the proposed computer directed training capability is that, with some adaptations, it could also be used to provide training in other uses of System 473L.

¹Some features in the currently proposed training sequence logic are revised versions of features incorporated in the training design proposed in the initial stages of this contract. This earlier phase of work culminated in the preparation of a technical documentary report (ESD-TDR-64-511), Operational Specification for Computer-Directed Instruction in the Operational Training Capability Query Language for System 473L, U. S. Air Force Headquarters, June 1964, prepared by Mr. David P. Yens and Mr. Harris H. Shettel.

Proficiency in Query Language itself is only a part of the total training requirement. Another element is to develop proficiency in the use of the system's integrated console. In this connection, using the console as the interface between the trainee and the training program has two advantages over a more conventional text or classroom-based program. It should:

- 1) increase trainee interest and motivation
- 2) provide more intensive and job related training on the use of the console and, therefore, increase transfer of training.

1.1.2 Experimental Research Values

In addition to its training utility, the proposed capability would also have significant experimental-research values, which are described below.

1.1.2.1 Different Training Conditions

The CDT program described in this document includes a comparison of two different training conditions represented by the alternate assignment of trainees to different groups, A and B. The essential difference between the two conditions is that Group A trainees will be required to take remedial materials on areas in which they make excessive errors, while Group B trainees will not. However, both groups will periodically have the option of taking review on chosen areas, if they wish.

1.1.2.2 Extensive Evaluative Data

The proposed program will provide evaluative data that is more extensive than that generally obtained by non-computer-based training studies. Such data will make it possible to relate various features of the program to performance measures. The evaluative data that will be made available consists of the following items:

1. Summary data for all trainees who have completed the program at any time
 - a. the date
 - b. the total number of trainees who have completed the program
 - c. the total number of trainees still in progress on the program
 - d. the average time to complete the program: for Group A and for Group B

- e. the average percent error on the program: for Group A and for Group B
 - f. the average percent error on the posttest: (1) on the first try and (2) on the final (second) try: for Group A and for Group B
 - g. the average percent error on each subcategory of QL: (1) averaged over all evaluative problems except the posttest for Group A and for Group B; and, (2) averaged over the posttest for all trainees
2. Individual trainee data for any trainee except a proficiency maintenance trainee, updated for any point during training and the final, updated data at the time the trainee completes the program
- a. the date on which the data is obtained
 - b. the trainee's name, serial number, and experimental group (A or B)
 - c. the cumulative training time for the trainee (at the time this data is obtained)
 - d. the trainee's average percent error over all evaluative problem sections requiring QL compositions except for the posttest
 - e. the trainee's average percent error on the posttest: (1) for the first try on each problem; and, (2) for the final (second) try on each problem
 - f. the trainee's average percent error on each of the initial problem sections that do not require composing QL statements
 - g. for each posttest problem: (1) the number of tries; (2) the possible number of errors; (3) the number of errors the trainee made on the first try; (4) the number of errors the trainee made on the second (final) try
 - h. for each QL subcategory: (1) the average percent error for the trainee over all QL-evaluative problem sections except the posttest (i.e., during training on Query Language); (2) the average percent error for the trainee on the posttest; (3) the number of times the trainee chose that subcategory for free-choice review over the entire program
 - i. the trainee's sequence of remedial materials for the last 20 training sets, identified as either forced remedial or free-choice

and further identified by the point at which these materials were taken (i.e., identified by the evaluative problem section immediately preceding each remedial set), the subcategory for which they were given, and the trainee's rating on that subcategory. Since the trainee's use of any remedial sequence for one of the initial, non-QL problem sections can be determined by whether his percent error on that section exceeded 5% and there is only one remedial sequence for each of the non-QL problem sections, and since the basic (vs. remedial) training sequence of sets is known, the above information will complete the set of information needed to determine the trainee's entire path through the program, and his location at any time prior to completion.

3. The complete QL statements typed by each trainee as answers to the data-retrieval problems in the practice exercises.
4. The complete QL statements typed by each trainee as answers to the posttest problems and the parts of these statements, as typed by the trainee, that underwent error analysis.

The comparison between Groups A and B plus an analysis of the various types of data made available, as described above, would not only provide information needed to make revisions in the training logic that would improve the overall efficiency and effectiveness of the CDT program, but such information would also increase the general level of knowledge with respect to the potential role of computer-based instructional systems in the military environment. Thus, if the CDT program is an effective teaching instrument, an immediate probability would be that this computer directed training capability could be used advantageously for teaching the use of other System 473L capabilities and as a general model for application to training for other computer-based systems.

1.1.3 Administrative Procedures

It will undoubtedly be desirable to have one or more persons assigned part-time as official instructors, or monitors, who would be responsible for the overall direction of the programmed training course. Air Staff personnel who were authorized to take the training course would report to one of these instructors and receive a training schedule. The instructors would periodically monitor the course to ensure that only authorized persons are taking the course and that trainees are completing the course within a reasonable span of time.

The instructors would be responsible for deleting a trainee's data if the trainee is forced to withdraw from the course for some reason, and they would also be responsible for authorized printouts of training data, either for all trainees as a group or for one or more individual trainees.

1.2 Capability Scope

This Operational Specification proposes the use of a computer directed training capability to teach the uses of Intermediate Query Language, Model II, as defined in Chapter 3 of 473L-OS-40: Operational Specification for Query Language, Model II, dated 13 April 1965, Unclassified. The uses specified by this chapter are those most commonly used by Air Staff personnel. Since the more flexible and advanced uses outlined in Chapter 4 of the above document are restricted primarily to programmer use (e.g., for maintaining and updating the data base), these uses were not considered appropriate for the proposed course.

By omitting coverage of infrequently used advanced QL functions, the proposed training package is designed to cover Intermediate QL usage more intensively. Thus, the proposed training package will provide fairly extensive sampling of the data base files in order to extend the trainee's knowledge of the data base and, therefore, his ability to use Query Language in a variety of practical situations.

1.3 Capability Bounds

Certain limitations to the use and operation of computer directed training have been adopted as logical and/or practical. These limitations are described in the following sections.

1.3.1 Complexity of the Training Design

In developing the Training Sequence Logic, there was a need to limit the complexity of the training design in order to optimize the feasibility of implementation in terms of a) The need to minimize any possible conflict with other 473L operational capabilities. In this connection, every effort was made to minimize computer storage space, but at the same time permit the operation of an effective computer directed training program. b) The cost of developing a computer program to implement the proposed logic. c) The cost of training itself (this would also increase with increasing complexity of training).

The major training restrictions imposed in order to increase the feasibility of computer implementation and reduce cost are described in the following sections.

1.3.1.1 Computer Error-Analysis

Computer analysis of trainee errors on the training materials will not be based on complete QL statements but on designated parts of each statement.

1.3.1.2 Canned Answers

The correct answer (or answers) used for computer matching with the trainee's answer to each part of a QL statement will be "canned" -- i.e., the answer will be provided in storage -- the computer will not be required to generate an answer for any problem.

An example of the logic adopted to maintain realistic training in spite of the restrictions imposed by the above two feasibility considerations is the use of practice exercise sets requiring no computer analysis, but giving the trainee feedback on the specification of complete Query Language statements for the problems in these sets.

1.3.1.3 Fixed Formats

Fixed formats are specified for training materials and problems so that content (but not format) changes could be made after the field tryout based on the tryout data.

1.3.1.4 Number of Remedial Loops

The training program has only one major level of remedial training loops after each evaluative problem section, i.e., no remedial loop is used to correct for errors on a remedial sequence itself. Consideration was given to the use of an additional level of remedial loops by imposing further evaluation and remedial branching on the first-level remedial sequences themselves, but this idea was not implemented due to the increased programming complexity and cost of training itself (due to increased time) that would result. It is felt that the single remedial loop will be satisfactory since the training materials will be tried out and revised before they are put into operational use.

1.3.2 Provision for Adaptation of Training and Evaluation Constraints

A provision for adaptation of training and evaluation constraints is necessitated by three major considerations. First, the proposed capability is an embryo capability that will require tryout with a minimum of 20 Air Staff trainees. Analysis of the data from such a tryout may indicate the need/desirability for changes in some of the training and evaluation parameters.

Second, the capability is proposed for training in Query Language, which is itself in a dynamic, evolving state. Therefore, some adaptation may be required from time to time by changes in Query Language.

Third, with some adaptations, the capability could be used to provide training in other uses of System 473L.

Several provisions have been made to permit adaptation of the capability for the above purposes. The provisions for adaptation allow maximum flexibility of the capability without any programming change. The adaptation changes may be achieved through data maintenance. Some of the areas in which data maintenance changes may be made are:

1. a) the content (but not the format) of any cue -- i.e., the content of any line on any cue may be changed.

- b) the number of cues within a set.

2. the criteria by which trainee errors are evaluated. As noted in the discussion of this capability in Chapter 2, a limit is placed on the number of evaluation ratings that can be used to evaluate the trainee's performance and assign remedial materials. Thus, the Criteria Matrix in Table 2-1 specifies that the possible ratings are EXCELLENT, GOOD, AVERAGE, and POOR. However, while the number of evaluation ratings is fixed (in lieu of a programming change), the error criteria for the various ratings that are specified in Table 2-1 will be stored in such a way that changes in these criteria would be relatively easy to make if experience so dictates.

3. the remedial continuations for trainee errors and free-choice, as specified in Tables 2-2, 2-3, and 2-4.

- and 4. (as necessitated by any change in #1b above) the possible number of errors for a given sequence of steps, as specified in Tables 2-5 and 2-6.

For programming purposes, IBM has restructured and joined the tables mentioned above (Tables 2-1 through 2-6) into four areas or matrices: the CUE FILE matrix, the CRITERIA matrix, the EVALUATION CONTINUATION matrix, and the ERROR matrix. These four matrices are defined by IBM in a separate, technical analysis report. The instructor may check the current contents of any of the above areas, before any updating occurs, by obtaining a line printer printout. The printouts for these areas are obtained by using four process step keys: "CUE FILE MATRIX", "CRITERIA MATRIX", "EVALUATION CONTINUATION MATRIX", and "ERROR MATRIX".

Additional areas in which data maintenance changes may be made are:

1. the number of pretest (X) sets (These sets are described in Sections 2.1.4, 2.2.1, and 2.2.2).
2. the number of posttest problems.
- and 3. the number of subcategories.

The instructor may check the current values for the above variables by obtaining a line printer printout. The printout for these values is obtained by using the process step key "FLEX COURSE".

Procedures for updating any of the above data are discussed in a separate, technical analysis report prepared by IBM.

Changes in areas that would not affect trainee continuations may be made any time, at the discretion of the instructor -- except that updating should not occur at the exact time that trainees are using the CDT overlay. However, four of the areas discussed above do affect trainee continuations: the number of cues within a set; the number of pretest (X) sets; the number of posttest problems; and the number of subcategories. Changes in these four areas may not take place until all trainees for whom data are currently stored have completed the computer directed training course, and no new student may start the CDT course until such updating is complete. In addition, updating cannot take place in any area at the exact time that trainees are using the CDT overlay.

Section II

TRAINING SEQUENCE LOGIC

This section describes the training sequence logic (TSL) for the proposed Computer Directed Training (CDT) capability, including sample training materials, sequences, evaluation criteria, types of storage required (i.e., types of data to be stored), and formats for output data.

2.1 A Brief, Overall Description of the Proposed Training Sequence Logic

This section is intended to provide an overall perspective that will facilitate understanding of the more detailed description of the Training Sequence Logic that is presented later in Section II. To enhance clarity, it is written as much as possible in outline form.

2.1.1 Three Basic Uses of the CDT Capability with Model II Query Language.

- 1) For training of personnel in the use of intermediate Query Language (as defined by Section III of the Operational Specification for Model II Query Language).
- 2) To provide performance data for one or more of the trainees undergoing initial training, at any stage of their training. This is intended primarily for official use in evaluating each trainee's proficiency in the use of Query Language.
- 3) For proficiency maintenance -- for trainees who have previously completed this or some other training program in Model II Query Language and now wish to review and strengthen particular aspects of the Language.

2.1.2 Computer Control of Major Aspects of Training and Evaluation.

- 1) The presentation of training materials.
- 2) Evaluation of trainee performance.
- 3) Determining areas in which a trainee has made excessive errors and determining the type of remedial work appropriate to the kind and number of errors made in each area.
- 4) Requiring the trainee to take the appropriate remedial work, when so specified by the experimental-research design (see Section 1.1.2.1).

- 5) Periodically determining the topics for which the trainee can exercise the option of taking remedial work if he wishes.

2.1.3 Trainee Control of Special Training Options

To increase the flexibility of training, some control over his training path and materials has been given to the trainee.

2.1.3.1 Proficiency Maintenance Options

Proficiency maintenance trainees can choose to take a self-evaluative test and/or remedial materials in desired areas.

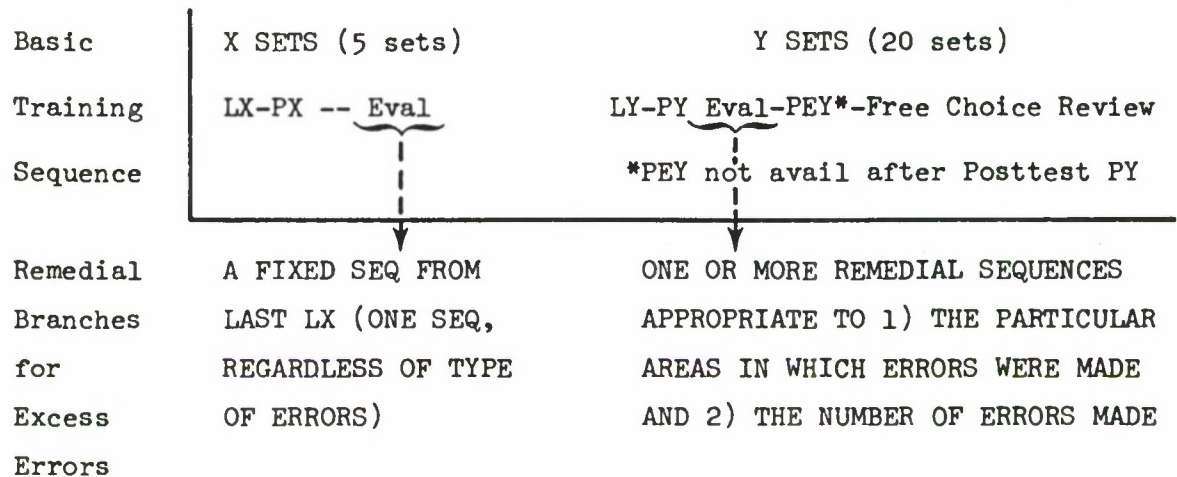
2.1.3.2 Training Options

During training, the trainee periodically has the option of taking remedial work, if he wishes, and of choosing the area in which he will take this work.

2.1.4 Basic Options and Sequences that Provide for the Three Basic Uses of the CDT Capability with Model II Intermediate Query Language

- 1) Proficiency Maintenance Training will consist of one or both of the following options:
 - a) the posttest that was given at the end of the initial training sequence (see 3, below).
 - b) free-choice review: the P-M trainee can choose to take review on any number of the QL subcategories covered in initial training.
- 2) The instructor, or other authorized person, may choose to obtain the following data:
 - a) data on one or more individual trainees who have not yet completed the program (when each trainee completes the program, his final data is printed out); or
 - b) summary data for all trainees who have completed the program.

3) Condensed View of the Basic Training Sequence and Remedial Branches



NOTES: The cues used by this capability may be divided into two major classes: (1) the cues that provide a basic foundation for the course but do not teach Query Language; these cues are divided into sets called "X" sets; and (2) the subsequent cues that cover all aspects of intermediate QL; these cues are divided into sets called "Y" sets.

- 1) The X SETS COVER BASIC, NON-QL MATERIALS:
 - a) the use of the instructional materials
 - b) the use of the console and the CDT overlay
 - c) a basic introduction to the files and structure of QL
 - d) the use of the manuals covering the QL data base and system vocabulary
- 2) The Y SETS cover all training and evaluation materials provided on the use of Query Language -- i.e., all materials not covered by X SETS
- 3) For any X SET:

LX = training sequence -- a section within the X SET

PX = series of problems on the LX -- a section within the X SET

Eval = evaluation of errors on the PX section
- 4) For any Y SET:

LY = training sequence -- a section within the Y SET

PY = series of problems on one or more of the preceding LY's -- a section within the Y SET

Eval = evaluation of errors on each area of QL subjected to analysis by the last PY section

PEY = series of free-form practice exercises (which trainee answers with complete QL statements and on which he receives feedback). This is a section within each of the Y sets except the last -- this is not available after the posttest

Free-Choice Review = at end of each Y set, the trainee has the option of taking review on any area subjected to analysis by the last PY section.

5) Throughout the entire program there are four general types of sets -- the basic, non-QL X sets and three kinds of QL Y sets. These sets are described below:

- a) 5 basic, non-QL X sets
- b) 13 INDEPENDENT Y SETS for each of which the PY section tests only the materials covered by the LY section in the same set
- c) 6 CUMULATIVE Y sets, used at appropriate points, in which the PY section tests all materials covered after the last CUMULATIVE Y set
- d) one POSTTEST Y set: this is the last Y set, for which the LY section reviews all materials covered in the program and the PY section is the POSTTEST, which tests all materials covered over all of the Y sets in the program.

2.1.5 A Comparison of the Options Available for Basic Training and Those Available for Proficiency Maintenance

This appears in the chart on the following page.

A Comparison of the Options Available for Basic
Training and Those Available for Proficiency Maintenance

		Basic Training	Proficiency Maintenance
X sets:	LX's	X	
(Basic,	PX's	X	
non-QL	Eval of PX's	X	
materials)			
Y sets:			
Indep & Cum LY's (training sequences)		X	
Indep & Cum PY's (test sequences)		X	
Computer Eval of PY's		X	
PEY's (test sequences with feedback and self-evaluation)		X	
Free-Choice Review on any QL subcategory (sequences accessed from the LY's for each subcategory)		X	X
Posttest LY		X	
Posttest PY		X	X

2.2 Detailed Presentation of the Training Sequence Logic

A condensed view of the basic training sequence and the remedial branches was presented in Section 2.1.4. A more detailed presentation is given in Figure 2-1 (page 2-44), the Training Sequence Logic Flow Diagram; Section 2.2.3, which gives the footnotes for Figure 2-1; Tables 2-1 through 2-7, and in the two discussion sections which follow.

2.2.1 Discussion of the Basic Training Sequence and Remedial Branches in Terms of Cue Types

There are two general types of cues used by this capability:

1) instructional cues - these cues are used primarily to instruct the operator (trainee) in the proper procedure for making a transition from one point in the training sequence to another. These instructional cues usually indicate the available options for continuing, and in some cases they provide feedback to the trainee regarding his performance on the last cue or series of cues.

2) learning cues - these cues are carefully prepared and sequenced so that the trainee will learn the desired criterion behaviors, e.g., how to write a SUM function.

The learning cues used by this capability are logically and sequentially divided into two major groups:

1) the non-QL learning cues - these cues provide a basic foundation for the course but do not teach Query Language itself. These cues are divided into sets called "X" sets, which precede all other learning cue sets used by this capability. Since the X sets precede the Query Language materials on which the final posttest is based, they are considered PRETEST sets.

2) the QL learning cues - these cues provide all training and evaluation materials in the use of Intermediate Query Language, Model II; these cues are divided into sets called "Y" sets.

Since some instructional cues are used at widely dispersed points in the training sequence, it is convenient to define a set as consisting of sequential, learning cues only; while an instructional cue may immediately precede a "set", it is not considered part of the set itself. Therefore, for this capability, only the learning cues have a set and number code specified (e.g., see line 2 of Q9 in Figure 3-10); the instructional cues do not. The learning cues are specified in Chapter 3 as Q8's, Q9's, Q11's, Q19's, and Q19A's.

In each non-QL X set, learning cues may be further subgrouped according to their sequence and function. There are two major sections of learning cues in each X set:

1) first, an LX section - this is a sequence of cues (Q9's) used primarily for training. Each LX section has two subsections: a) the initial series that provides basic training, and b) the final series that reviews the information taught in the first section.

2) second, a PX section - this is a sequence of cues (Q8's) used primarily for evaluation of the trainee's proficiency on the information covered in the preceding LX section.

In each X set, these two sections are followed by computer error-analysis of the trainee's responses on the PX cues and, if necessary, appropriate remedial work.

Learning cues may also be subgrouped in each Y set according to their sequence and function. There are three major sections of learning cues in each Y set:

1) first, an LY section - this is a sequence of cues (Q9's) used primarily for training. Each LY section has three subsections, in this general order: a) the basic training sequence, called a TEXT sequence; b) the sequence that reviews the information taught by the TEXT sequence -- this is called a REVIEW sequence; and c) a series of cues that emphasize the development of QL statements for specified data retrieval problems. This series is intended to give the trainee practice in using the QL elements taught in the TEXT and REVIEW sequences. This is called a PRACTICE PROBLEM sequence.

2) second, a PY section - this is a series of cues (Q11's) used primarily for evaluation of the trainee's proficiency on the information in one or more of the preceding LY's. The complexity of the computer error-analysis on each problem is minimized by the restriction of error-analysis to specified parts of the appropriate QL statement.

In each Y set, these two sections are followed by computer error-analysis of the trainee's responses on the PY cues and, if necessary, appropriate remedial work. There are three levels of remedial work, appropriate to three evaluation-ratings, GOOD, AVERAGE and POOR. In general, remedial work for a rating of POOR is excerpted from a TEXT subsection of an LY section; remedial work for a rating of AVERAGE is excerpted from a REVIEW subsection of an LY section; and, remedial work for a rating of GOOD is excerpted from a PRACTICE PROBLEM subsection of an LY section. Since remedial work in an area is forced on a trainee in Group A if his PY errors on that area were excessive, any remedial sequence taken at this point is called a FORCED REMEDIAL sequence.

3) Following the error-analysis and any necessary remedial work for a Y set is a PEY section - this is a series of cues (Q19's and Q19A's) that give the trainee practice in developing complete QL statements for specified problems, with feedback to the trainee indicating the correct QL statement for each problem presented. This section is not used for computer evaluation; it is only used for a trainee's self-evaluation. Since the trainee's answers in this section are not evaluated by the computer, the answer format used by the trainee does not constitute a problem for error-analysis. Therefore, the trainee types the entire QL

statement as his answer, not just the restricted excerpts required for his answers in the PY section. Since these cues provide practice in writing QL statements and the answer formats are not artificially restricted by the length of the answer required, these cues are called free-form practice exercises.

For each Y set, after these three sections are complete, the trainee is given the option of taking remedial work in one or more areas for which the trainee's responses in the last PY section were evaluated. Since remedial work at this point is taken only by free-choice and consists of REVIEW materials from one of the last LY sections, a remedial sequence that the trainee chooses to take at this point is called FREE-CHOICE REVIEW. As noted earlier, this is the only remedial work available to Group B.

As mentioned previously, the X and Y sets are different in terms of their position in the overall training sequence and their general training function: X sets are placed first and emphasize non-QL topics; Y sets are last and emphasize the use of QL elements. Cue sets may also be differentiated in terms of their general training function and the overall scope of their training-and-evaluation materials. In terms of function and scope, there are four types of sets:

All of the X sets are of one type:

- 1) non-QL PRETEST sets -- these precede the QL materials that are tested by the final posttest; in each set, the PX section tests only the materials covered by the LX section in the same set.

The Y sets include three different types of sets:

- 2) QL, INDEPENDENT sets -- in each set, the LY section teaches new materials, and the PY section tests only the materials covered by the LY section in the same set.
- 3) QL, CUMULATIVE sets -- in each set, the LY section reviews the materials covered in the INDEPENDENT sets that followed the last CUMULATIVE set, and the PY section tests all materials covered after the last CUMULATIVE Y set.
- 4) the QL, POSTTEST set -- in this set, the LY section reviews the materials covered throughout all of the sets. The PY section is the posttest, which tests all materials covered over all of the other Y sets in the program. It is, in effect, the end-of-course criterion test.

The entire program consists of the following sets, in the order described:

- 1) five non-QL, PRETEST X sets
- 2) a series of 13 QL, INDEPENDENT Y sets, with six QL, CUMULATIVE Y sets interpolated at appropriate points in the overall sequence
- 3) one QL, POSTTEST Y set

2.2.2 Discussion of the Basic Training Sequence in Terms of the Contents of Successive Sets

The proposed sequence of instructional materials would parallel, for the most part, the general content sequence that was used effectively in the programmed texts developed to teach OTC Query Language (Self-Instructional Course in OTC Query Language Volumes I-XXIII. Bedford, Mass.: Air Force Electronic Systems Division, Decision Sciences Laboratory, 1964. ESD-TDR-64-443), the major exception being that additional materials would necessarily be required for use at the beginning of the computer directed training course to instruct the trainee in the use of the console and the Computer Directed Training (CDT) Overlay. In addition, added emphasis is planned in this course on the development of proficiency in the use of the data base and system vocabulary, and complex Queries are covered.

In the proposed content outline given below, a description is given of the general contents of each set of computer directed training materials. There are 25 sets counting the five X sets, the 19 INDEPENDENT and CUMULATIVE Y sets, and the one POSTTEST Y set. Each set is identified below by alphabetic code and the type of set it represents.

	SET	CONTENTS
X SETS	A	A brief introduction to the use of the console and the CDT overlay; use of the instructional materials; use of the CDT Exhibit Book.*
	B	More detailed coverage on the use of the console and the CDT overlay.
	C	The computer component and the input and output devices of the 473L System; the file structure and the types of data

* Information that is used repeatedly throughout the program will be formatted for easy reference and bound into an exhibit book, which will be available for the trainee's use during his training sessions on the console.

X SETS (cont.)	{		storage utilized by System 473L; basic methods of data retrieval with System 473L; more on the use of the console and the CDT overlay.
		D	Basic elements of a QL statement; introduction to Error Messages; use of the AF manuals covering the QL data base and system vocabulary; more on the use of the CDT Exhibit Book.
		E	More on the use of the AF manuals covering the QL data base and system vocabulary; more on the use of the CDT Exhibit Book; more on the use of the console and the CDT overlay.
INDEP Y SETS	{	F	The Simple Qualifier
		G	Basic instruction on writing the Output Director and Output Selector
CUM Y SET	{	H	Review of F and G
INDEP Y SETS	{	I	Special features of the qualifier
		J	Special features of the selector
CUM Y SET	{	K	Review of I and J
INDEP Y SETS	{	L	GCD functions
		M	MIN and MAX functions
CUM Y SET	{	N	Review of L and M
INDEP Y SETS	{	O	More on MIN and MAX functions
		P	GREATEST and LEAST, and Review of MIN and MAX
CUM Y SET	{	Q	Review of O and P
INDEP Y SETS	{	R	Simple uses of SUM
		S	More complex uses of SUM
CUM Y SET	{	T	Review of R and S
INDEP Y SETS	{	U	Titles and Sorting and Compound Qualifiers
		V	SAVE Procedures and CHECK
CUM Y SET	{	W	Review of U and V
INDEP Y SET	{	X	Complex Queries
POSTTEST Y SET	{	Y	Review and Practice of Sets F through X, and the Posttest

2.2.3 Footnotes for the Training Sequence Logic Flow Diagram

(Figure 2-1, page 2-44)

The following notes reference the points having the corresponding footnote numbers on the Training Sequence Logic Flow Diagram, given in Figure 2-1.

1. The description of Q1 is given in Figure 3-2. The designated format and purpose are fixed. The number of distinct Q1's that will be available is 1 (one).

2. This box indicates that the operator has pressed a key to indicate that he is a person authorized to obtain data on one or more of the trainees taking the program and/or to modify the training materials (e.g., to incorporate any revisions in the content of the training cues that are suggested by trainee data during the field tryout). Actually, this overlay key is also available to trainees, but it is not an integral part of their training program and it is intended primarily for official use: 1) initially, to evaluate the program (using tryout data); 2) to delete the data for an individual trainee (e.g., if a trainee must for some reason discontinue the training course); 3) after the field tryout, to make any necessary revisions in the training materials; and 4) when the tryout is complete and any necessary revisions have been made on the training program, to evaluate trainee performance.

Since some of the options available to an instructor require tape and/or card input, if he desires one of these options he should contact the console operator before he takes any action on the computer and indicate that he wants a particular tape mounted and/or that he wants a specified set of cards to be read in.

3. The description of Q3 is given in Figure 3-4. The designated format and purpose are fixed. The number of distinct Q3's that will be available is 1 (one).

This cue allows the operator to indicate that he wants an individual trainee's performance data, either for deletion or printed out (on P/O 2, as shown in Figure 3-42), or summary data for all trainees (P/O 1, as shown in Figure 3-41).

4. The description of Q5 is given in Figure 3-6. The designated format and purpose are fixed. The number of distinct Q5's that will be available is 1 (one).

This cue requests that the operator type and enter the name and serial number of the individual trainee whose data he wants to either obtain on a printout or delete. If he wants a printout, he then presses "ENTER". If he wants to delete the trainee's data, he types an asterisk on Q5 before he presses "ENTER".

5. Since it is conceivable that some trainees may start the computer directed training course but not be able to finish it for some reason, such as conflicting duties, there will be a delete procedure whereby an instructor may delete the data stored for any specified trainee. This box indicates that on Q5 (see footnote 4), the instructor typed an asterisk to indicate that he wished to delete the trainee's data, and the computer will now delete the specified trainee's data.

6. P/O 2 is the Line Printer Printout of an Individual Trainee's Data. This printout is intended primarily for official use.

The description of P/O 2 is given in Figure 3-42. The designated format is fixed.

7. P/O 1 is the Line Printer Printout of Summary Data for All Trainees. It includes training and posttest data only for trainees who have completed the program; as soon as a trainee completes the program, his performance data are used to update the summary data. This printout does not include any data for proficiency maintenance trainees.

A description of P/O 1 is given in Figure 3-41. The designated format is fixed.

8. To provide for revision of the training materials for Model II Query Language, based on the field tryout of these materials, and to provide for possible use of this capability for other training courses, there will be an update capability, whereby the content of the cues used to present the training matter may be changed. The process for implementing this update capability will be described in a separate report prepared by IBM.

9. This box indicates that the operator has pressed a key to access the materials that are available for proficiency maintenance.

10. The description of Q6 is given in Figure 3-7. The designated format and purpose are fixed. The number of distinct Q6's that will be available is 1 (one).

This cue requests the proficiency maintenance (P-M) trainee (person who has previously completed this program, or some other equivalent program) to enter his name and serial number so that data can be stored regarding his performance.

Evaluative data will not be compiled for a P-M trainee. His data will consist only of his name, serial number, and training time. The P-M trainee's data will not be entered into the summary data available on P/O 1 and there will be no P/O 2.

11. The description of Q2 is given in Figure 3-3. The designated format and purpose are fixed. The number of distinct Q2's that will be available is 1 (one).

As indicated by the content of this cue, at any point the proficiency maintenance trainee has two options: he can choose to take the posttest or to take free-choice review (or, like other trainees, he can stop by pressing "TERMINATE TRAINING").

As exemplified by the last instruction on this cue, the trainee will usually be instructed to use a "TERMINATE TRAINING" key when he wishes to stop; this key will be lit whenever a cue is present. This is desired because the storage of data for work done so far on a set will be completed when "TERMINATE TRAINING" is pressed, but if the trainee finishes a problem and gets off without pressing "TERMINATE TRAINING", his data (if any) on the last incomplete problem set will be lost.

12. This box indicates that the operator has pressed an overlay key specifying that he is currently taking the Computer Directed Training Program, either as an old trainee (i.e., one who has already completed part of the program and will enter at a point appropriate to where he left off) or as a new trainee (i.e., one who has not previously taken any part of the training program).

13. The description of Q6 is given in Figure 3-7. The designated format and purpose are fixed. The number of distinct Q6's that will be available is 1 (one). This cue is used by old trainees and new trainees. The usage by each is described below, in paragraphs A and B.

A. When an old trainee enters his name and serial number, the computer will check the data stored for this trainee and determine where he left off and where he should start. As indicated in footnote 11, a trainee is advised that if he wishes to get off the computer, he should press "TERMINATE TRAINING". Since "TERMINATE TRAINING" is lit when a cue is presented, the presentation of a cue is considered a "continuation point," i.e., a point where a trainee can get off and for which there is an appropriate continuation when he comes back on. The computer will have a flag associated with each type of continuation point (CP). Any time a trainee leaves the computer, the flag for his CP will be stored (as specified by Table 2-7). The sequence of Remedial Continuation points for Y sets and presentations of the free-choice review index (either Q4 or Q21) will be available for P/O 2.

The appropriate continuation for each type of CP may be described in general terms as follows:

1) Special type: If the trainee leaves in the middle of a "remedial sequence," when he returns he will have to start over again at the beginning of the sequence. A "remedial sequence" is given either as a forced remedial sequence after excess errors on a particular subcategory of a problem set, or as free-choice review. Particular sequences that are "remedial sequences" are identified as such in subsequent footnotes.

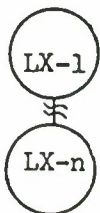

2) General type: Except for the particular case in #1 above, the trainee is presented the last cue for which data storage has not been completed:

a) If the trainee leaves when a cue is present and presses "TERMINATE TRAINING", his continuation point is defined by that cue and when he returns, he will be given the cue that was present when he went off the computer, except for the particular case in #1 above. b) If the trainee leaves and does not press "TERMINATE TRAINING" before he presses "COMPL OPER", his data on the last incomplete set will be lost. In this case he will be forced to start at the beginning of this set.

B. When a new trainee enters his name and serial number, the computer will store this as part of his trainee data (available on P/O 2). It will also assign him to one of two groups, A or B, and store his group assignment along with his trainee data (available for P/O 2). Successive trainees will be assigned to opposite groups, with the first trainee assigned to A, the second to B, etc. This assignment is for experimental purposes, to determine the effects of two

different training conditions. The conditions for A and B are designated at a later point on the flow diagram. As noted earlier, the essential difference is that Group A trainees will be required to take remedial materials covering areas for which excessive errors are made, while Group B trainees will not. However, both groups will periodically have the option of taking free-choice review on chosen areas, if they wish. This variation may be dropped, if desired, after the field tryout of the CDT program, i.e., all future trainees could be assigned to whichever group did better in the tryout (either A or B). However, until data are collected on the relative effectiveness of these two conditions, the present operational specification, which specifies a group variation, will be followed.

For any trainee, whether old or new, the trainee's time going on and going off will be established by the computer. The time per session will be calculated as the difference between the time shown on the first displayed cue and the time shown on the last cue for a given run. Cumulative time will be updated at the end of every training set, and the computed time per session will be used to update the cumulative time entry in the trainee's data (see P/O 2).

14.  represents a continuous series of teaching steps within an X set. (Each LX section will be followed by a test section, a PX.) Each time the trainee returns to this point (connector ) , he will obtain the next set. L stands for linear, i.e., the steps in this L section do not branch but are continuous; X is a variable that represents a particular set; l and n stand for the particular step, l meaning the first step in that section and n the last step in the L section.

The X sets will be used to teach basic information on: the use of the instructional materials; the use of the console and the CDT (computer directed training) overlay; a basic introduction to the files and structure of Query Language; and, the use of the manuals covering the data base and system vocabulary.

Before each LX section, there will be a Q7, which instructs the trainee on the use of these steps. The description of Q7 is given in Figure 3-8. The designated format and purpose are fixed. The number of distinct Q7's that will be available is 1 (one).

Within each LX section there will be a series of Q9's, which are linear instructional steps covering a particular topic or set of topics. Within this

series of Q9's the steps that introduce and give basic instruction will be available for later remedial work as TEXT materials; the steps that review the materials covered in the TEXT steps will be available for later remedial work as REVIEW materials; the final steps on a topic that require the trainee to demonstrate the highest level of proficiency to be achieved on that topic within the set are problems that will be available for later remedial work as PRACTICE PROBLEMS. TEXT, REVIEW, and PRACTICE PROBLEMS are referenced on subsequent parts of the flow diagram.

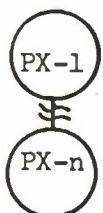
The description of a Q9 is given in Figure 3-10. The designated format and purpose are fixed. An example of the content that might be specified on this cue, including the material typed by the trainee, is given in Figure 3-11. The estimate of the total number of distinct Q9's that will be available to the trainee over all training sets (both X and Y sets) is given in Appendix D.

While the trainee is working on one of the LX sets, the computer will store the value of X (the particular set) and the value of i (the last step that was completed within the set as specified by Table 2-7). The answer for each Q9 in a set will appear on the next Q9 in the set.

The last step (i) available for each LX will be indicated by a flag.

On the cues used for an LX set, X and i will be specified on line 2 by a four-character alphanumeric code. The first character will be alphabetic and will represent the value of X (the set); the next three characters will be numeric and will represent the value of i (the step number). The step numbers for a particular X set will be sequential, regardless of the transition from the LX's to the PX's within the same set (and, therefore, regardless of the cue-type, i.e., whether Q9 or Q8). No set will exceed 999 steps regardless of type.

There will be no evaluation of the trainee's performance on the LX sets.

15.  represents a series of problems in an X set that will be used to evaluate the trainee's proficiency on the materials covered by the preceding LX instructional section of the same X set. P stands for problem, X represents the value of the particular set; and 1 and n stand for the number of the particular problem.

Before each PX set, there will be a Q10, which instructs the trainee in the proper use of a PX problem set. The description of Q10 is given in Figure 3-12.

The designated format and purpose are fixed. The number of distinct Q10's that will be available is 1 (one).

Q10 will be followed by the PX section of an X set. Within each PX section, there will be a series of Q8's, which will be problems. The description of a Q8 is given in Figure 3-9. The designated format and purpose are fixed. An example of the content that might be specified on this cue, including the material typed by the trainee, is given in Figure 3-11. The estimate of the total number of distinct Q8's that will be available is given in Appendix D.

While the trainee is working on one of the PX sections, the computer will store the value of X (the particular set) and the value of i (the last step completed within the set) as specified by Table 2-7. In addition, the computer will evaluate the trainee's typed responses on each problem by matching his responses against those provided under the heading CORRECT ANSWER TO LAST STEP on the next Q8 within the section; thus, the answer for the Q8 for the first problem in the first set will appear on the Q8 for the second problem in the first set. The computer will store a running tally of the trainee's errors on a PX (as specified by Table 2-7) and when it is complete then, using the Poss # E's (possible number of errors) for the PX section (as specified in Table 2-6), the computer will compute and store the trainee's percent error on the PX. This will be available on P/O 2 (see Figure 3-42).

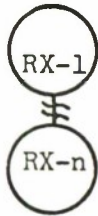
The Q8's require both the presentation of the trainee's answer to the preceding Q8 and the evaluation of each answer. Since evaluation will result in a reformatting of the trainee's answer in all but one-word answers, a reverse reformatting would be necessary to display the trainee's original answer on the next cue. To avoid this problem, all Q8's will have either multiple-choice or one-word answers.

The last problem (i) available for each PX section will be indicated by a flag.

On the cues, X and i will be specified on line 2. The alphabetic code will represent the value of X; the numeric code will represent the value of i. The step numbers for a particular X set will be sequential, regardless of the transition from the LX section to the PX section (and, thus, regardless of cue-type -- whether Q9 or Q8). No set will exceed 999 steps, regardless of type.

16. The computer will test the trainee's overall percent error on the last PX section against 5%.

17.



represents a sequence of "remedial" steps that can be excerpted from the LX section of an X set. R stands for remedial; X represents the value of the particular set; 1 and n stand for the number of the particular step. An RX sub-

section will consist primarily of REVIEW materials, but may include both TEXT and REVIEW materials, to be obtained from the last LX section; the steps accessed will be a continuous sequence within the last LX. The particular steps to be available as an RX, or remedial continuation, after each PX will be specified by Table 2-4.

Before each RX subsection, there will be a Q12, which informs the trainee that he made excess errors on the last PX section and must take remedial work. The description of Q12 is given in Figure 3-15. The designated format and purpose are fixed. The number of distinct Q12's that will be available is 1 (one). Q12 will be followed by an RX subsection.

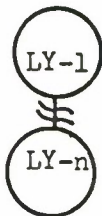
Within each RX subsection, there will be a series of Q9's. The description of a Q9 is given in Figure 3-10. The designated format and purpose are fixed. An example of the content that might be specified on this cue, including the material typed by the trainee, is given in Figure 3-11. The estimate of the total number of distinct Q9's that will be available is given in Appendix D.

While the trainee is working on an RX subsection, the computer will store the value of X (there is no need to store the value of i since the continuation for an OLD TRAINEE who was forced to stop in the middle of a remedial sequence such as an RX is to start over again at the beginning of the same remedial sequence).

There will be no evaluation of the trainee's performance on an RX sequence.

18. Q13 tells the trainee that his performance on the last PX section was good. The description of Q13 is given in Figure 3-16. The designated format and purpose are fixed. The number of distinct Q13's that will be available is 1 (one).

19. The computer will test the value of X stored for the trainee against the value used to indicate the last X set.

20.  represents a continuous series of teaching steps within a Y set. (Each LY section will be followed by an evaluation section, a PY). Each time the trainee returns to connector (4), he will start on the next Y set. L stands for linear, i.e., the steps do not branch but are continuous; Y represents a particular set; 1 and n stand for the particular step, 1 meaning the first step in the LY section of the Y set, and n the last step in the LY section. The Y sets will include all training and evaluative materials that follow the five basic X sets. The estimated number of Y sets is 20. Of the 20 LY sections corresponding to these Y sets, thirteen (13) will be INDEPENDENT sections that teach new information, six (6) will be CUMULATIVE sections that review segments of the information previously taught, and the last will be a POSTTEST LY that immediately precedes the posttest and reviews all materials covered in the Y sets. Generally, every series of two INDEPENDENT sets will be followed by the appropriate CUMULATIVE set. Each CUMULATIVE LY section will concentrate on the INDEPENDENT materials covered after the last CUMULATIVE Y set.

Before each LY section, there will be a Q7, which instructs the trainee on the use of these steps. The description of Q7 is given in Figure 3-8. The designated format and purpose are fixed. The number of distinct Q7's that will be available is 1 (one). Q7 will be followed by the LY section of a Y set.

Within each LY section, there will be a series of Q9's, which are instructional steps covering a particular topic or set of topics. Within this series of Q9's, the steps that introduce and give basic instruction will be available for later remedial work as TEXT materials; the steps that review the materials covered in the TEXT steps will be available for later remedial work as REVIEW materials; the final steps on a topic that require the trainee to demonstrate the highest level of proficiency to be achieved on that topic within the set are problems that will be available for later remedial work as PRACTICE PROBLEMS. Since the PRACTICE PROBLEMS may be evaluated at a later point (see footnotes 79 and 84) they, like the Q8's and for the same reason (see footnote 15), will have either multiple-choice or one-word answers. TEXT, REVIEW, and PRACTICE PROBLEMS are referenced on subsequent parts of the flow diagram.

The description of a Q9 is given in Figure 3-10. The designated format and purpose are fixed. An example of the content that might be specified on this cue, including the material typed by the trainee, is given in Figure 3-11. The estimate of the total number of distinct Q9's that will be available to the trainee over all training sets (both X and Y sets) is given in Appendix D.

While the trainee is working on one of the LY sections, the computer will store the value of Y (the particular set) and the value of i (the last step completed within the set) as specified by Table 2-7.

The last i available for each LY will be indicated by a flag.

On the cues, Y and i will be specified on line 2. The alphabetic code will represent the value of Y; the numeric code will represent the value of i. The step numbers for a particular Y set will be sequential, regardless of the transition from the LY section to the PY section and from a PY section to a PEY section (the practice exercises for that Y set) and regardless of cue-type (e.g., whether Q9 or Q11 or Q19 or Q19A). No set will exceed 999 steps, regardless of type.

There will be no evaluation of the trainee's performance on an LY section.

21. Q14 instructs the trainee on the use of the problems that will now be presented. The description of Q14 is given in Figure 3-17. The designated format and purpose are fixed. The number of distinct Q14's that will be available is 1 (one).

22. PY-1 stands for a problem in a Y set that will be used to evaluate the trainee's proficiency on the materials covered by the preceding LY instructional section of the Y set. There will be a series of these problems within each Y set; thus, the problems will constitute an evaluation section (a PY section) within the Y set. Each problem requires that the trainee type an appropriate Query Language statement and then type specified parts of this statement in particular locations, for error-analysis by the computer. P stands for problem, Y represents the value of the particular set; and 1 means the first problem in the PY section of the Y set. Each time the trainee is returned to connector 2 he will get the next problem in the PY section of the Y set on which he is working, unless he enters on a TRY AGAIN routine, in which case he will get the last problem again; if he is just starting a PY section, he will get the first problem.

Each problem in a PY section will be a Q11. The description of Q11 is given in Figure 3-13. The designated format and purpose are fixed. An example of the content that might be specified on this cue, including the material typed by the trainee is given in Figure 3-14. The estimate of the total number of distinct Q11's that will be available while the trainee is working on the program is given in Appendix D.

The Y sets will include all training and evaluative materials that follow the basic X sets. The estimated number of Y sets is 20. Of the 20 PY sections corresponding to these Y sets, thirteen (13) will be INDEPENDENT sections that evaluate the materials covered in the corresponding INDEPENDENT LY sections; six (6) will be CUMULATIVE sections that evaluate the materials covered in the corresponding CUMULATIVE LY sections; and, the last PY section will be the POSTTEST, that will evaluate the materials that were covered over all Y sets, and reviewed in the last POSTTEST LY section.

While the trainee is working on a PY section, the computer will store whether the problem section is INDEPENDENT or CUMULATIVE or the POSTTEST, and it will store the value of Y and the value of i (as specified by Table 2-7). In addition, although the computer will not analyze the complete Query Language statements, the computer will evaluate the trainee's typed responses for the specified parts of each problem by matching his responses against those provided for programmer use for that problem. The answer provided for each PY problem will specify the correct answers and the subcategory to be associated with each answer. The answer will not be presented to the trainee. The computer will store 1) whether the problem was completely correct or not, and 2) on the second try, or on the first try if the trainee refuses to try again, the number of errors on each topical subcategory (for a complete list of subcategories that will be evaluated at one or more points in the program see subcategory numbers 1-120 on Q4 in Figure 3-5); for a particular PY problem section, a relatively small number of subcategories will be evaluated, each problem in a PY section having a possible maximum of four (4) subcategories to be evaluated. Since the estimated number of problems for each INDEPENDENT PY section is 5, the estimated maximum number of subcategories available for analysis for each INDEPENDENT PY section is 5 times 4, or 20; since the estimated number of problems for each CUMULATIVE PY section is 10, the estimated maximum number of subcategories to be analyzed for each CUMULATIVE PY section is 10 times 4 or 40.

As successive problems in a PY section are completed, the tally of errors on each subcategory will be updated, so that it will be a cumulative tally for each subcategory analyzed in the problem section. The storage of this running tally is specified in Table 2-7. This tally on each subcategory used in a problem set is used to determine the trainee's rating on each subcategory for the last PY, which will appear on Q21. This error tally and rating are also referenced

at a later point on the flow diagram to determine whether the trainees in Group A (not in B, since they are not forced to take remedial) need remedial work on that subcategory and, if so, what kind of remedial work is needed.

After each PY section (in successive Y sets) is completed, the tally of errors for a trainee on each subcategory on the last PY section is used, along with the possible number of errors on each subcategory for the PY (as specified in Table 2-5), to update the percent error on each subcategory (to be available in P/O 2 under TRG) and the average percent error on the entire program (also for P/O 2), with the exception that the subcategory errors on the posttest will be separate entries and will not be used to update the TRG tally. When this updating has occurred, the running tally of errors for the last PY section can be set equal to zero, so that this tally can start from zero for the next PY section.

Until a trainee completes a problem section for a Y set and the associated free-form practice exercises and free-choice review (these are specified at a later point on the flow diagram) and goes on to the next Y set, the value of Y must be stored.

On the cues, Y and i will be specified on line 2. The alphabetic code will represent the value of Y; the numeric code will represent the value of i. The step numbers for a particular Y set will be sequential, regardless of the transition within the set from the LY section to the PY section and from the PY section to the PEY section (the free-form practice exercises for the Y set) and regardless of cue-type (e.g., whether Q9 or Q11 or Q19 or Q19A). No set will exceed 999 steps, regardless of type.

23. The computer will determine whether the trainee's answer to the last problem was correct.

24. Q15 informs the trainee that his answer to the last problem was correct. The description of Q15 is given in Figure 3-18. The designated format and purpose are fixed. The number of distinct Q15's that will be available is 1 (one).

25. If the trainee's answer to a problem on the first try is wrong, the computer will set the value of TRY in storage (see Table 2-7) equal to 1; the second time through a problem, TRY will be set equal to 2.

26. The computer tests the value of TRY stored for the trainee (see Table 2-7) against 1.

27. Q17 informs the trainee that he missed the problem again and must go on to the next problem. The description of Q17 is given in Figure 3-20. The designated format and purpose are fixed. The number of distinct Q17's that will be available is 1 (one).

28. Q16 advises the trainee that his answer was wrong but he may try the problem again if he wishes. The description of Q16 is given in Figure 3-19. The format and purpose are fixed. The number of distinct Q16's that will be available is 1 (one).

29. The computer will test for the flag indicating that the current i is the last i available for that PY section.

30. The computer will test the stored value designating the trainee's group (either A or B) against A.

31. The computer will test the stored value that indicates whether the trainee is on an INDEPENDENT set or CUMULATIVE set or the POSTTEST against the value used to designate INDEPENDENT. (The requirement for storage of a value designating problem type is specified in Table 2-7.)

32. The computer will determine whether the subcategory just evaluated for the trainee was the last subcategory available for analysis on the current problem section. (The last subcategory available for a particular problem section can be determined by the computer since the subcategory number for each problem answer will be provided for programmer use.)

33. The computer will pick up the next subcategory available for analysis for the last problem section.

34. The computer will determine whether the trainee's number of errors on the last problem section for the subcategory now being analyzed was more than zero. The first time this test is made for a problem section, the computer will test the

number of errors on the first subcategory that was used in that problem section; then, each successive time this test is made for a particular problem section, the test will be made on the next subcategory used in that problem section. Until the next subcategory is picked up, the computer will store a value for the subcategory under analysis (as specified by Table 2-7).

35. If the trainee made no errors on a subcategory, his rating for that subcategory will be EXCELLENT as specified in Table 2-1. The computer will store the trainee's rating on the subcategory now under analysis for the last problem section (as specified by Table 2-7).

36. According to the error criteria specified in Table 2-1, for INDEPENDENT PY's, the computer will determine whether the trainee should be given a rating of POOR. The computer will store the rating given to a trainee for the subcategory now under analysis for the last PY section (as specified by Table 2-7).

37. According to the error criterion specified in Table 2-1 for INDEPENDENT PY's, the computer will determine whether the trainee should be given a rating of AVG; if not, his rating is GOOD. The computer will store the rating given to a trainee for the subcategory now under analysis for the last PY section (as specified by Table 2-7).

38. The computer will determine whether the subcategory just evaluated for the trainee was the last subcategory available for analysis on the current problem section. (The last subcategory available for a particular problem section can be determined by the computer since the subcategory number for each problem answer will be provided for programmer use.)

39. The computer will pick up the next subcategory available for analysis for the last problem section.

40. The computer will determine whether the trainee's number of errors on the last problem section for the particular subcategory now being analyzed was more than zero. The first time this test is made for a problem section, the computer will test the number of errors on the first subcategory that was used in that problem section; then, each successive time this test is made for a particular problem section, the test will be made on the next subcategory used in that

problem section. Until the next subcategory is picked up, the computer will store a value for the subcategory under analysis (as specified by Table 2-7).

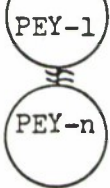
41. If the trainee made no errors on a subcategory, his rating for that subcategory will be EXCELLENT, as specified by Table 2-1. The computer will store the trainee's rating on the subcategory now under analysis for the last problem section (as specified by Table 2-7).

42. According to the error criteria specified in Table 2-1 for CUMULATIVE PY's, the computer will determine whether the trainee should be given a rating of POOR. The computer will store the trainee's rating on the subcategory now under analysis for the last PY section (as specified by Table 2-7).

43. According to the error criterion specified in Table 2-1 for CUMULATIVE PY's, the computer will determine whether the trainee should be given a rating of AVG; if not, his rating is GOOD. The computer will store the trainee's rating on the subcategory now under analysis for the last PY section (as specified by Table 2-7).

44. Trainees in Group B get errors recorded as defined in footnote 22 and they are given a rating on each subcategory for the last problem section according to the criteria specified in Table 2-1, which rating is to be available for P/O 2, but they are not forced to take any remedial work. They are still given the option of taking free-choice review, as specified at a later point on the flow diagram.

45. Q18 instructs the trainee in the use of the practice exercises that will now be given. Q18 is described in Figure 3-21. The format and purpose are fixed. The number of distinct Q18's that will be available is 1 (one).

46.  represents a series of practice exercises within a Y set. This series, or PEY section, comes after the LY and PY sections of every Y set except for the last one, in which the PY section is the POSTTEST. A PEY section consists of problems requiring the trainee to type appropriate Query Language statements in free-form (without any special format and without making excerpts for analysis) and

then to check his answer against the correct answer given on the next cue (a Q19A). The answers to these problems will not undergo error analysis by the computer but they will give the trainee practice in writing complete Query Language statements and checking the accuracy of his work. PE stands for Practice Exercise; Y represents the value of the particular set; l and n stand for the number of the particular problem within the practice exercise section, l meaning the first problem within the section and n the last problem in the section. Each practice exercise section gives practice in writing Query Language statements that use the material covered in the preceding LY section.

Each problem in a PEY section will be a Q19. Each correct answer in a PEY section will be a Q19A. The description of Q19 is given in Figure 3-22. The description of Q19A is given in Figure 3-23. An example of the content that might be specified on each of these cues, including the material typed by the trainee, is given on Figures 3-24 and 3-25. The estimate of the total number of distinct Q19's, and Q19A's, that will be available while the trainee is working on the program is given in Appendix D.

47. The trainee's answer to each practice exercise problem will be printed out on the line printer in P/O 3 format, as specified in Figure 3-43. Each of these printout pages will be identified by trainee name and set-and-problem code. (This printout is required because trainee performance on these problems during the field tryout will be used for our evaluation of the program and our comparison of the A and B groups.)

48. Q20 advises the trainee that he may take remedial REVIEW material, if he wishes, on any subcategory covered by the last training set. The trainee is asked to indicate whether he wants to do this. The description of Q20 is given in Figure 3-26. The format and purpose are fixed. The number of distinct Q20's that will be available is 1 (one).

49. The computer tests the value of Y stored for the trainee against the value stored for the last Y set that precedes the POSTTEST. The requirement for storage of this value for LAST Y BEFORE POSTTEST is specified in Table 2-2.

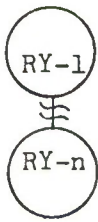
50. Q21 is an index containing the trainee's rating on each subcategory used for analysis by the last PY. The appropriate subcategory numbers will be

generated along with the appropriate descriptions and the trainee's rating on each subcategory. The trainee is told to type the subcategory code for the desired subcategory in line 5, columns 55-57. (Each subcategory code number on Q21 will be a 3-digit number, right justified with leading zeros, but the number typed by the trainee may or may not have leading zeros; if leading zeros are omitted by the trainee, the number he typed within columns 55-57 will be interpreted regardless of which of these columns he started in.)

Q21 is described in Figure 3-27. The format and purpose are fixed. The number of distinct Q21's that will be available is 1 (one).

For a trainee who is not a proficiency maintenance trainee, the stored tally for the subcategory chosen (available on P/O 2) must be increased by 1.

51. Q22 gives the trainee instructions for using the review sequence on the chosen subcategory. The description of Q22 is given in Figure 3-28. The format and purpose are fixed. The number of distinct Q22's that will be available is 1 (one).

52.  represents, at this point, a set of remedial REVIEW steps on the subcategory corresponding to the number typed in by the trainee on the Index for Free-Choice Review for Trainees Who Have Not Yet Completed the Program (Q21). The particular sequences used will be obtained from the last INDEPENDENT LY section except that if the preceding LY was CUMULATIVE, a sequence will be obtained from one or more preceding LY sections.

For a particular PY and subcategory, the specific sequence or sequences available for free-choice review (under connector (5) on the TSL flow diagram) will be the same as those specified under AVG for that problem section and subcategory in Table 2-2.

For each RY sequence specified in Table 2-2 as an AVG continuation (to be used for free-choice review) on a particular subcategory and after a particular PY, R stands for Review; Y represents the value of Y specified for free-choice review in each case in Table 2-2; 1 and n represent particular steps, 1 for the first step specified for that Y in Table 2-2 and n for the last step specified for that Y in Table 2-2. Since an RY sequence may access several Y sets when the last PY was CUMULATIVE, there may be a number of RY sequences for the same PY and

subcategory. If the last PY was INDEPENDENT, the maximum number of RY sequences is 1 (one); if the last PY was CUMULATIVE, the maximum number is 2 (two).

Each RY step is a Q9. The description of Q9 is given in Figure 3-10. The format and purpose are fixed. An example of the type of content that might appear on this cue is given in Figure 3-11. An estimate of the number of Q9's that will be available is given in Appendix D.

There is no computer evaluation of errors on an RY sequence. While the trainee is working on this sequence, the value of Y will be stored. (If the trainee must stop in the middle of free-choice review, he will be sent back to the beginning when he returns.)

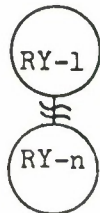
53. While the trainee is working on an RY sequence for free-choice review, the "SKIP" key will be lit. By using this key the trainee may get out of the sequence. If he does so, he will be sent to the same continuation point that he would have reached had he completed the remedial sequence. The continuation point is indicated here by connector (15).

54. Q20 requests the trainee to indicate whether he wants to choose another subcategory for review. The description of Q20 is given in Figure 3-26. The format and purpose are fixed. The number of distinct Q20's that will be available is 1 (one).

55. Q4 is an index containing the number and description and general category for all subcategories that undergo problem analysis at any time during the program (subcategory numbers 1-120) plus a few additional subcategories that cannot feasibly undergo problem analysis but that the trainee might wish to review at various times (numbers 121-135). The trainee is requested to type the subcategory code for the desired subcategory in line 5, columns 55-57. (Each subcategory code number on Q4 will be a 3-digit number, right justified with leading zeros, but the number typed by the trainee may or may not have leading zeros; if leading zeros are omitted by the trainee, the number he typed within columns 55-57 will be interpreted regardless of which of these columns he started in.) All subcategories (1-135) will be available. Q4 is a 6-page cue that is described in Figure 3-5. The format and purpose are fixed. The number of distinct Q4's that will be available is 1 (one).

For a trainee who is not a proficiency maintenance trainee, the stored tally for the subcategory chosen (available on P/O 2) must be increased by 1.

56. Q22 gives the trainee instructions for using the review sequence on the chosen subcategory. The description of Q22 is given in Figure 3-28. The format and purpose are fixed. The number of distinct Q22's that will be available is 1 (one).

57.  represents, at this point, a set of remedial REVIEW steps on the subcategory corresponding to the number typed in by the trainee on the Index for Free-Choice Review for Trainees Who Have Completed the Program (Q4). The sequences used will be obtained from any of the CUMULATIVE LY sections and/or the POSTTEST LY section. The particular sequence(s) to be used for each subcategory, including subcategories 121-135 (which are available for remedial work only for trainees who are either proficiency maintenance trainees or who have already completed the posttest) will be as specified in Table 2-3.

R stands for Review; Y represents a specified set; 1 and n represent specified steps, 1 meaning the first step specified in Table 2-3 and n the last, for the specified set. For a given subcategory, there may be a maximum of 7 (seven) RY sequences.

Each RY step is a Q9. The description of Q9 is given in Figure 3-10. The format and purpose are fixed. An example of the type of content that might appear on this cue is given in Figure 3-11. An estimate of the number of Q9's that will be available is given in Appendix D.

There is no computer evaluation of errors on an RY sequence. While the trainee is working on this sequence, the value of Y will be stored. (If the trainee gets off in the middle of free-choice review, he will be sent to the beginning when he returns.)

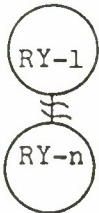
58. While the trainee is working on an RY sequence for free-choice review, the "SKIP" key will be lit. By using this key the trainee may get out of the sequence. If he does so, he will be sent to the same continuation point that he would have reached had he completed the remedial sequence. This continuation point is indicated here by connector (22).

59. Q20 requests the trainee to indicate whether he wants to choose another subcategory for review. The description of Q20 is given in Figure 3-26. The format and purpose are fixed. The number of distinct Q20's that will be available is 1 (one).

60. Q4 is an index containing the number and description and general category for all subcategories that undergo problem analysis at any time during the program (subcategory numbers 1-120) plus a few additional subcategories that cannot feasibly undergo problem analysis but that the trainee might wish to review at various times (numbers 121-135). The trainee is requested to type the subcategory code for the desired subcategory in line 5, columns 55-57. (Each subcategory code number on Q4 will be a 3-digit number, right justified with leading zeros, but the number typed by the trainee may or may not have leading zeros; if leading zeros are omitted by the trainee, the number he typed within columns 55-57 will be interpreted regardless of which of these columns he started in.) All subcategories (1-135) will be available. Q4 is a 6-page cue that is described in Figure 3-5. The format and purpose are fixed. The number of distinct Q4's that will be available is 1 (one).

For a trainee who is not a proficiency maintenance trainee, the stored tally for the subcategory chosen (available on P/O 2) must be increased by 1.

61. Q22 gives the trainee instructions for using the review sequence on the chosen subcategory. The description of Q22 is given in Figure 3-28. The format and purpose are fixed. The number of distinct Q22's that will be available is 1 (one).

62.  represents, at this point, a set of remedial REVIEW steps on the subcategory corresponding to the number typed in by the trainee on the Index for Free-Choice Review for Trainees Who Have Completed the Program (Q4). The sequences used will be obtained from any of the CUMULATIVE LY sections and/or the POSTTEST LY section. The particular sequence(s) to be used for each subcategory, including subcategories 121-135 (which are available for remedial work only for trainees who are either proficiency maintenance trainees or who have already completed the posttest) will be as specified in Table 2-3.

R stands for Review; Y represents a specified set; 1 and n represent specified steps, 1 meaning the first step specified in Table 2-3 and n the last, for the specified set. For a given subcategory, there may be a maximum of 7 (seven) RY sequences.

Each RY step is a Q9. The description of Q9 is given in Figure 3-10. The format and purpose are fixed. An example of the type of content that might appear on this cue is given in Figure 3-11. An estimate of the number of Q9's that will be available is given in Appendix D.

There is no computer evaluation of errors on an RY sequence. While the trainee is working on this sequence, the value of Y will be stored. (If the trainee must stop in the middle of free-choice review, he will be sent back to the beginning when he returns.)

63. While the trainee is working on an RY sequence for free-choice review, the "SKIP" key will be lit. By using this key the trainee may get out of the sequence. If he does so, he will be sent to the same continuation point that he would have reached had he completed the remedial sequence. This continuation point is indicated here by connector (24).

64. Q23 requests the trainee to indicate whether he wants to choose another subcategory for review. The description of Q23 is given in Figure 3-29. The format and purpose are fixed. The number of distinct Q23's that will be available is 1 (one).


65. Q31 informs the trainee that he has completed the training program. When Q31 is displayed to a trainee, the data in his individual trainee record (the data specified for P/O 2) that is required for the data in the summary record (the data specified for P/O 1) will be used to update this summary data; the individual trainee's data will be printed out on a P/O 2 and the data stored for this trainee will be dumped.

The description of Q31 is given in Figure 3-37. The format and purpose are fixed. The number of distinct Q31's that will be available is 1 (one).

66. P/O 2 is a line printer printout of Individual Trainee Data. This printout is intended primarily for official use. The description of P/O 2 is given in Figure 3-42. The designated format is fixed.

67. The computer will test the stored value that indicates whether the trainee is on an INDEPENDENT PY section or CUMULATIVE PY section or the POSTTEST against the value used to designate INDEPENDENT. (The requirement for storage of a value designating problem type is specified in Table 2-7.)

68. Q24 advises the trainee that on the last problem section, his performance was POOR on a subcategory for which he will now get remedial materials. The description of Q24 is given in Figure 3-30. The format and purpose are fixed. The number of distinct Q24's that will be available is 1 (one).

69.  represents a sequence of remedial TEXT steps on the subcategory just analyzed, for which the trainee's rating was POOR. The particular sequence used will be obtained from the LY section of the last INDEPENDENT Y set. The particular TEXT sequence to be used for each analyzed subcategory after each INDEPENDENT PY section will be specified under POOR in Table 2-2.

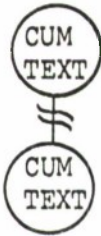
TEXT indicates that the materials are basic instructional materials (as specified in footnote 20); Y represents the value of Y stored for the trainee; 1 and n stand for the particular step, 1 meaning the first step specified under POOR for the particular Y and subcategory in Table 2-2, and n meaning the last step specified under POOR for the particular Y and subcategory in Table 2-2.

Each TEXT Y step is a Q9. The description of Q9 is given in Figure 3-10. The format and purpose are fixed. An example of the type of content that might appear on this cue is given in Figure 3-11. An estimate of the number of Q9's that will be available is given in Appendix D.

There is no computer evaluation of errors on a TEXT Y sequence. While the trainee is working on this sequence the value of Y will be stored.

70. Q24 advises the trainee that on the last problem section, his performance was POOR on a subcategory for which he will now get remedial materials. The description of Q24 is given in Figure 3-30. The format and purpose are fixed. The number of distinct Q24's that will be available is 1 (one).

71.



represents a series of remedial TEXT steps on the subcategory just analyzed from a CUMULATIVE PY section, for which the trainee's rating was POOR. The particular sequences used will be obtained from one or more of the last LY sections that followed a CUMULATIVE PY section. The particular TEXT sequences to be used for each subcategory available for analysis after each CUMULATIVE PY section will be specified under POOR in Table 2-2.

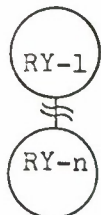
Each CUM TEXT step is a Q9. The description of Q9 is given in Figure 3-10. The format and purpose are fixed. An example of the type of content that might appear on this cue is given in Figure 3-11. An estimate of the number of Q9's that will be available is given in Appendix D.

There is no computer evaluation of errors on a CUM TEXT sequence. While the trainee is working on this sequence, the value of Y will be stored.

72. The computer will test the stored value that indicates whether the trainee is on an INDEPENDENT PY section or CUMULATIVE PY section or the POSTTEST against the value used to designate INDEPENDENT. (The requirement for storage of a value designating problem type is specified in Table 2-7.)

73. Q25 advises the trainee that on the last problem section, his performance was AVG on a subcategory for which he will now get remedial REVIEW materials or, that while his performance on the problem section was GOOD (but not EXCELLENT) on a subcategory, he got the remedial PRACTICE PROBLEM wrong and therefore he will now get remedial REVIEW materials on that subcategory. The description of Q25 is given in Figure 3-31. The format and purpose are fixed. The number of distinct Q25's that will be available is 1 (one).

74.



represents a sequence of remedial REVIEW steps on the subcategory just analyzed. The particular sequence used will be obtained from the last INDEPENDENT LY section. The particular REVIEW sequence to be used for each analyzed subcategory

after each INDEPENDENT PY section will be specified under AVG in Table 2-2.

RY REVIEW materials are materials within an LY section that review the information taught by the basic instructional TEXT materials (as specified in footnote 20). R stands for REVIEW; Y represents the value of Y stored for the trainee;

l and n stand for particular steps, l meaning the first step specified under AVG for the particular Y and subcategory in Table 2-2, and n meaning the last step specified under AVG for the particular Y and subcategory in Table 2-2.

Each RY step is a Q9. The description of Q9 is given in Figure 3-10. The format and purpose are fixed. An example of the type of content that might appear on this cue is given in Figure 3-11. An estimate of the number of Q9's that will be available is given in Appendix D.

There is no computer evaluation of errors on an RY sequence. While the trainee is working on this sequence, the value of Y will be stored.

75. Q25 advises the trainee that on the last problem section, his performance was AVG on a subcategory for which he will now get remedial REVIEW materials or, that although his performance on the problem section was GOOD (but not EXCELLENT) on a subcategory, he got the remedial PRACTICE PROBLEM wrong and therefore, he will now get remedial REVIEW materials on that subcategory. The description of Q25 is given in Figure 3-31. The format and purpose are fixed. The number of distinct Q25's that will be available is 1 (one).

76.



represents a series of remedial REVIEW steps on the subcategory just analyzed on a CUMULATIVE PY section. The particular review sequences used will be obtained from one or more of the last LY sections that followed a CUMULATIVE PY section. The particular REVIEW sequences to be used for each subcategory

available for analysis after each CUMULATIVE PY section will be specified under AVG in Table 2-2.

Each CUM REVIEW step is a Q9. The description of Q9 is given in Figure 3-10. The format and purpose are fixed. An example of the type of content that might appear on this cue is given in Figure 3-11. An estimate of the number of Q9's that will be available is given in Appendix D.

There is no computer evaluation of errors on a CUM REVIEW sequence. While the trainee is working on this sequence, the value of Y will be stored.

77. The computer will test the stored value that indicates whether the trainee is on an INDEPENDENT PY section or CUMULATIVE PY section or the POSTTEST against the value used to designate INDEPENDENT. (The requirement for storage of a value designating problem type is specified in Table 2-7.)

78. Q26 advises the trainee that his performance on the last INDEPENDENT problem section was GOOD, but not EXCELLENT, for a subcategory on which he will now get a remedial PRACTICE PROBLEM. The description of Q26 is given in Figure 3-32. The format and purpose are fixed. The number of distinct Q26's that will be available is 1 (one).

79.

PRACTICE
Y

is a remedial PRACTICE PROBLEM on the subcategory just analyzed on an INDEPENDENT PY section. The particular problem used will be obtained from the last LY section.

The particular problem to be used for each analyzed subcategory after each INDEPENDENT PY section will be specified under GOOD in Table 2-2. The computer must pick up this problem and the next one, since the answer to the specified problem appears on the next problem cue in the original LY sequence, but the second cue is picked up for error checking only; the second cue will not be given to the trainee at this point.

Since the PRACTICE PROBLEMS used in remedial sequences undergo evaluation, and must also be appropriate for use in an LY section where each cue shows the trainee's answer to the last problem, each PRACTICE Y is a Q9 that will have multiple-choice or one-word answers (see further discussion in footnote 15). The description of Q9 is given in Figure 3-10. The format and purpose are fixed. An example of the type of content that might appear on this cue is given in Figure 3-11. An estimate of the number of Q9's that will be available is given in Appendix D.

While the trainee is working on this problem, the value of Y and i will be stored. In addition, the computer will determine whether the trainee's answer to the PRACTICE PROBLEM was correct by checking his answer against the one that appears on the problem cue that followed this PRACTICE PROBLEM cue in the original LY section.


80. The computer takes alternate actions depending on whether the trainee's answer to the remedial PRACTICE PROBLEM was correct.

81. Trainee's rating will be changed to AVG.

82. Q27 advises the trainee that his answer to the PRACTICE PROBLEM was not correct and that he must take additional remedial material on the subcategory for

which the PRACTICE PROBLEM was being used. The description of Q27 appears in Figure 3-33. The format and purpose are fixed. The number of distinct Q27's that will be available is 1 (one).

83. Q26 advises the trainee that his performance was GOOD but not EXCELLENT on the last CUMULATIVE PY section for a subcategory on which he will now get a remedial PRACTICE PROBLEM. The description of Q26 is given in Figure 3-32. The format and purpose are fixed. The number of distinct Q26's that will be available is 1 (one).

84.  is a remedial PRACTICE PROBLEM on the subcategory just analyzed for a CUMULATIVE PY set. The particular problem used will be from one of the last LY sections that followed a CUMULATIVE PY section. The particular problem to be used for each analyzed subcategory after each CUMULATIVE PY section will be the one specified for the PY set under GOOD in Table 2-2. The computer must pick up this problem (and the one that immediately follows it in the designated PY set, but for checking purposes only, since the answer for the desired problem will appear on the cue that follows it in the original sequence -- the second cue will not be given to the trainee).

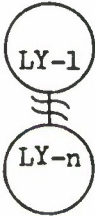
Since the PRACTICE PROBLEMS used in remedial sequences undergo evaluation and must also be appropriate for use in an LY section, each CUM PRACT PROB used for remedial work is a Q9 that will have multiple-choice or one-word answers (see footnote 15). The description of Q9 is given in Figure 3-10. The format and purpose are fixed. An example of the type of content that might appear on a Q9 is given in Figure 3-11. The estimate of the number of Q9's that will be available is given in Appendix D.

While the trainee is working on this problem, the value of Y and i will be stored. In addition, the computer will determine whether the trainee's answer to the PRACTICE PROBLEM was correct by checking his answer against the one given in the cue immediately following the remedial problem in the original LY sequence.

85. The computer takes alternate actions depending on whether the trainee's answer to the remedial PRACTICE PROBLEM was correct.

86. Trainee's rating will be changed to AVG.

87. Q27 advises the trainee that his answer to the PRACTICE PROBLEM was not correct and that he must take additional remedial material on the subcategory for which the PRACTICE PROBLEM was being used. The description of Q27 appears in Figure 3-33. The format and purpose are fixed. The number of distinct Q27's that will be available is 1 (one).

88.  represents a continuous series of teaching steps within a Y set. L stands for linear, i.e., the steps do not branch but are continuous; Y represents a particular set; 1 and n stand for the particular step, 1 meaning the first step in the LY section of the set and n the last step in the LY section of the set.

This is the very last POSTTEST LY section, immediately preceding the POSTTEST PY section, and will cover all materials taught throughout all Y sets.

Before this LY section there will be a Q7, which instructs the trainee on the use of these steps. The description of Q7 is given in Figure 3-8. The designated format and purpose are fixed. The number of distinct Q7's that will be available is 1 (one). Q7 will be followed at this point by the LY section that immediately precedes the POSTTEST.

Within the LY section, there will be a series of Q9's, which are instructional steps covering a particular topic or set of topics. Within this series of Q9's, the steps that introduce and give basic instruction will be available for later remedial work as TEXT materials; the steps that review the materials covered in the TEXT steps will be available for later remedial work as REVIEW materials; the final steps on a topic that require the trainee to demonstrate the highest level of proficiency to be achieved on that topic within the set are problems that will be available for later remedial work as PRACTICE PROBLEMS. The PRACTICE PROBLEMS will have either multiple-choice or one-word answers (see footnote 20).

The description of a Q9 is given in Figure 3-10. The designated format and purpose are fixed. An example of the content that might be specified on this cue, including the material typed by the trainee, is given in Figure 3-11. The estimate of the total number of distinct Q9's that will be available to the trainee over all training sets (both X and Y sets) while he is working on the program is given in Appendix D.

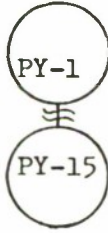
While the trainee is working on the LY section, the computer will store the value of Y (the particular set) and the value of i (the last step completed within the set as specified by Table 2-7).

The last i available for the LY will be indicated by a flag.

On the cues, Y and i will be specified on line 2. The alphabetic code will represent the value of Y; the numeric code will represent the value of i. The step numbers for a particular Y set will be sequential, regardless of the transition from the LY section to the PY section and from the PY section to the PEY section (the practice exercises for that Y set) and regardless of cue-type (e.g., whether Q9 or Q11 or Q19 or Q19A). No set will exceed 999 steps, regardless of type.

There will be no evaluation of the trainee's performance on an LY section.

89. Q28 gives the trainee instructions for taking the POSTTEST problems. The description of Q28 is given in Figure 3-34. The format and purpose are fixed. The number of distinct Q28's that will be available is 1 (one).

90.  stands for the series of 15 POSTTEST problems, which are to be taken in succession by the trainee. P stands for problem; Y represents the value of the set; 1 stands for the first problem and 15 is the number of the last problem on the POSTTEST.

Each PY step on the POSTTEST is a Q11. The description of Q11 is given in Figure 3-13. The format and purpose are fixed. An example of the type of content that might appear on a Q11 is given in Figure 3-14. An estimate of the number of Q11's that will be available is given in Appendix D.

As each POSTTEST problem is answered, the computer will determine whether the trainee's answer is correct by checking his answers against the answers provided for programmer use for that problem. As indicated later on the flow diagram, the trainee will be given a second try on those problems that are answered incorrectly on the first try. The trainee's number of errors on each POSTTEST problem will be tallied for both the first try and the second try (as required for P/O 2). If the problem is correct on the first try, 0 will be entered on that problem for both the first try and the second try. On completion of the first and second time through the POSTTEST, the computer will use the stored number of errors for first

and second try on each problem and the possible number of errors on each problem (specified in Table 2-5) to compute the percent error on the POSTTEST for the first-try column and then the second-try column and these percent errors will be available in P/O 2.

Although ratings are not given to trainees on Q⁴ after the POSTTEST, and the remedial sequence for any errors ($\#E > 0$) on a subcategory is fixed, regardless of the actual number of errors, the percent errors on each subcategory is needed for P/O 2. Therefore, while the POSTTEST is being completed, the computer will tally the number of errors on each subcategory as obtained from the first try of each problem (as specified by Table 2-7, item #10) and this will be used along with the possible number of errors (specified in Table 2-5) to compute the percent error on each subcategory for the POSTTEST (available in P/O 2). In addition, the tally of errors on each subcategory will be used to determine whether the trainee needs any remedial work.

Since each POSTTEST problem has a maximum of 4 (four) subcategories to be evaluated and there are 15 (fifteen) POSTTEST problems, the maximum number of subcategories available for analysis for the POSTTEST is 60.

Further, a printout will be made on the line printer of both the first-try and second-try answers given by each trainee on the POSTTEST (except for P-M trainees), identified by the problem set-and-number code (a 4-character code) and by trainee name.

91. P/O 4 will be a line printer printout of the trainee's answer to a POSTTEST problem. This will be printed out for both the first and second try of all POSTTEST problems.


The description of P/O 4 is given in Figure 3-44.

92. The computer will test the value of the last subcategory that underwent analysis against the value of the last subcategory available for analysis on the POSTTEST problems. The computer will be able to determine the value of the first and each successive subcategory available for analysis since the subcategory identified with each answer on a Q11 problem will be provided for programmer use.

93. The computer will pick up the next subcategory available for analysis for the last problem section.

94. The computer will test the stored tally for number of errors over all POSTTEST problems on the first subcategory used for analysis by the POSTTEST problems against 0. Each successive time this test is made, it will be made on the next subcategory available for analysis on the POSTTEST. The computer will be able to determine the value of the first and each successive subcategory available for analysis since the subcategory identified with each answer on a problem will be provided for programmer use.

95. Q29 advises the trainee that on the POSTTEST he made errors on a subcategory for which he will now get remedial REVIEW materials. The description of Q29 is given in Figure 3-35. The format and purpose are fixed. The number of distinct Q29's that will be available is 1 (one).

96.  represents a set of remedial REVIEW steps on the subcategory just analyzed on the POSTTEST problems. The particular sequences used will be obtained from the CUMULATIVE LY sections used throughout the program and the final, POSTTEST LY section. The particular sequences to be accessed from these sections for each analyzed subcategory on the POSTTEST will be specified in Table 2-3.

Each REVIEW step is a Q9. The description of Q9 is given in Figure 3-10. The format and purpose are fixed. An example of the type of content that might appear on this cue is given in Figure 3-11. An estimate of the number of Q9's that will be available is given in Appendix D.

There is no computer evaluation of errors on a REVIEW sequence. While the trainee is working on this sequence, the value of Y will be stored.

97. The computer tests the value of n for the last POSTTEST problem tried over again against the value for the last incorrect POSTTEST problem.

98. The computer will pick-up the next POSTTEST problem for the first-try analysis, i.e., the POSTTEST problem following the problem that just underwent analysis.

99. The computer will determine whether there were any errors on POSTTEST problem n on the first try. The first time through this test for a particular trainee, n will equal 1, i.e., the test will be made on the first POSTTEST problem.

The computer will store the value of n indicating the number of the POSTTEST problem for which the first-try analysis has just been completed (as specified in Table 2-7).

100. Q30 informs the trainee that he made errors on a particular POSTTEST problem and he must now take this problem again. The description of Q30 is given in Figure 3-36. The format and purpose are fixed. The number of distinct Q30's that will be available is 1 (one).

101. PY-n is the last POSTTEST problem that was tested by the test specified in footnote 99. The trainee must now try this problem again before he can go on. The computer must tally number of errors and use at end, along with TOTAL POSSIBLE number of errors (Table 2-5), to compute percent error for FINAL TRY on POSTTEST (to be used for P/O 2).

PY-n is a Q11. The description of Q11 is given in Figure 3-13. The format and purpose are fixed. An example of the type of content that might appear on a Q11 is given in Figure 3-14. An estimate of the number of Q11's that will be available is given in Appendix D.

102. P/O 4 will be a line printer printout of the trainee's answers to a POSTTEST problem. This will be printed out for all POSTTEST problems.

The description of P/O 4 is given in Figure 3-44.

103. Q23 advises the trainee that he may take remedial REVIEW material, if he wishes, on any subcategory. The trainee is asked to indicate whether he wants to do this. The description of Q23 is given in Figure 3-29. The format and purpose are fixed. The number of distinct Q23's that will be available is 1 (one).

104. P/O 2 is a line printer printout of Individual Trainee Data. This printout is intended primarily for official use.

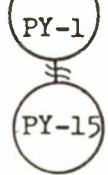
The description of P/O 2 is given in Figure 3-42. The designated format is fixed.

105. Q31 informs the trainee that he has completed the training program. When Q31 is displayed to a trainee, the data in his individual trainee record (the data specified for P/O 2) that is required for the data in the summary record

(the data specified for P/O 1) will be used to update this summary data; the individual trainee's data will be printed out on a P/O 2 and the data stored for this trainee will be dumped.

The description of Q31 is given in Figure 3-37. The format and purpose are fixed. The number of distinct Q31's that will be available is 1 (one).

106. Q28 gives the trainee instructions for taking the POSTTEST problems. The description of Q28 is given in Figure 3-34. The format and purpose are fixed. The number of distinct Q28's that will be available is 1 (one).

107.  stands for the series of 15 POSTTEST problems, which are to be taken in succession by the P-M trainee. P stands for problem; Y represents the value of the set; 1 stands for the first problem and 15 is the number of the last problem on the POSTTEST.

Each PY step on the POSTTEST is a Q11. The description of Q11 is given in Figure 3-13. The format and purpose are fixed. An example of the type of content that might appear on a Q11 is given in Figure 3-14. An estimate of the number of Q11's that will be available is given in Appendix D.

There is no evaluation of the POSTTEST problems for a proficiency maintenance trainee.

108. P/O5 is the Line Printer Printout of Cues. The cues are stored in the CUE FILE MATRIX set up for programming purposes; this matrix is described by IBM in a separate report.

Since the cues will be stored on tape, if the instructor wants this printout he should contact the console operator before he takes any action on the computer and indicate that he wants the CUE tape mounted.

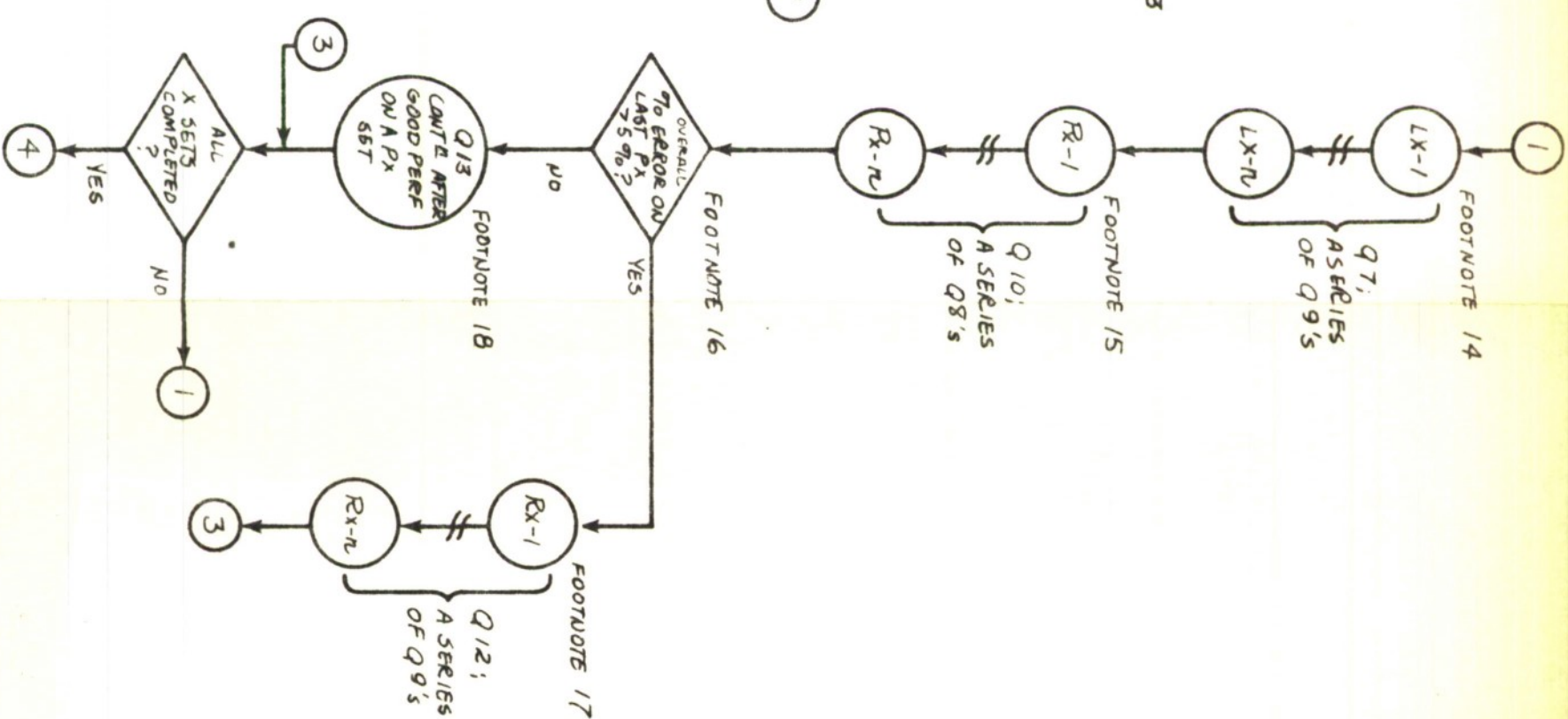
109. P/O6 is the Line Printer Printout of Criteria (the data specified in Table 2-1). The criteria are stored in the CRITERIA matrix set up for programming purposes; this matrix is described by IBM in a separate report.

110. P/O7 is the Line Printer Printout of Remedial Continuations (the data specified in Tables 2-2, 2-3, and 2-4). The remedial continuations are

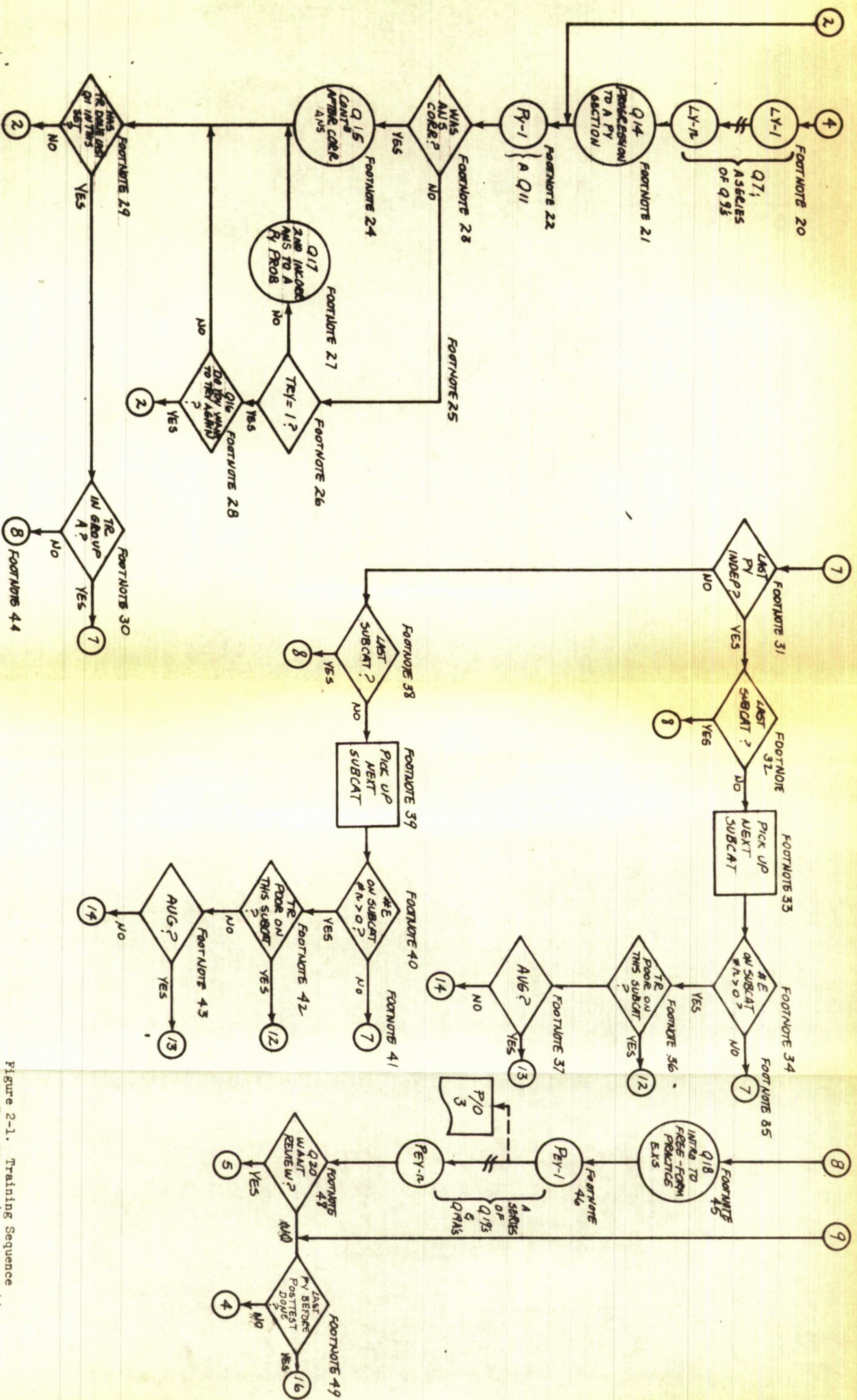
stored in the EVALUATION CONTINUATION matrix set up for programming purposes; this matrix is described by IBM in a separate report.

111. P/08 is the Line Printer Printout of the Possible Number of Errors on Each Subcategory for Each PY Section; on Each PX Section; and on Each Posttest Problem (the data specified in Tables 2-5 and 2-6). The possible number of errors on the specified sections are stored in the ERROR matrix set up for programming purposes; this matrix is described by IBM in a separate report.

112. P/09 is the Line Printer Printout of the Number of PRETEST (X) Sets, the Number of POSTTEST Problems, and the Number of Subcategories (the data specified in Table 2-8). These data are stored in the FLEX COURSE matrix set up for programming purposes; this matrix is described by IBM in a separate report.



~~2-42~~ 2-44



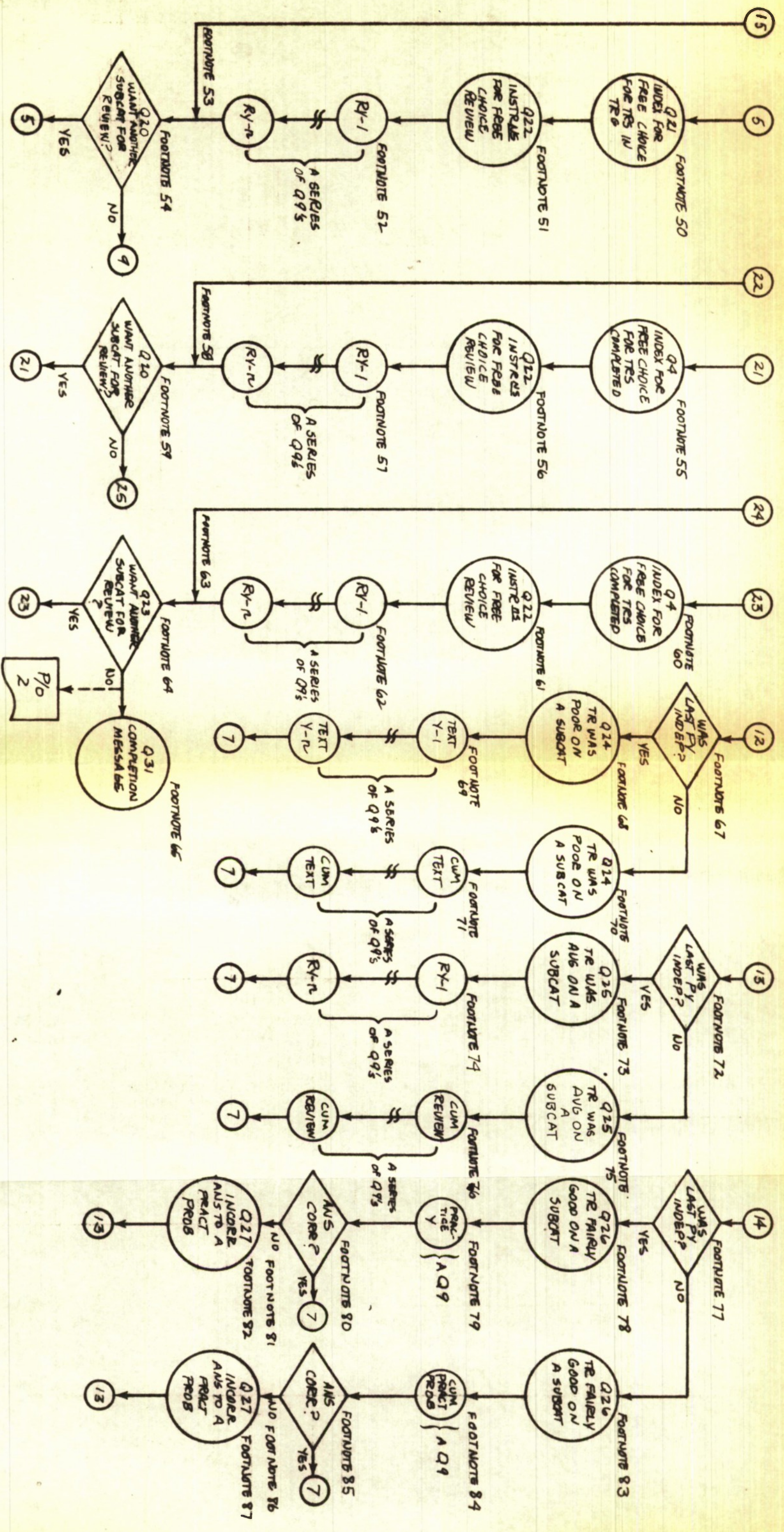


Figure 2-1. Training Sequence Logic Flow Diagram (sheet 3 of 4)

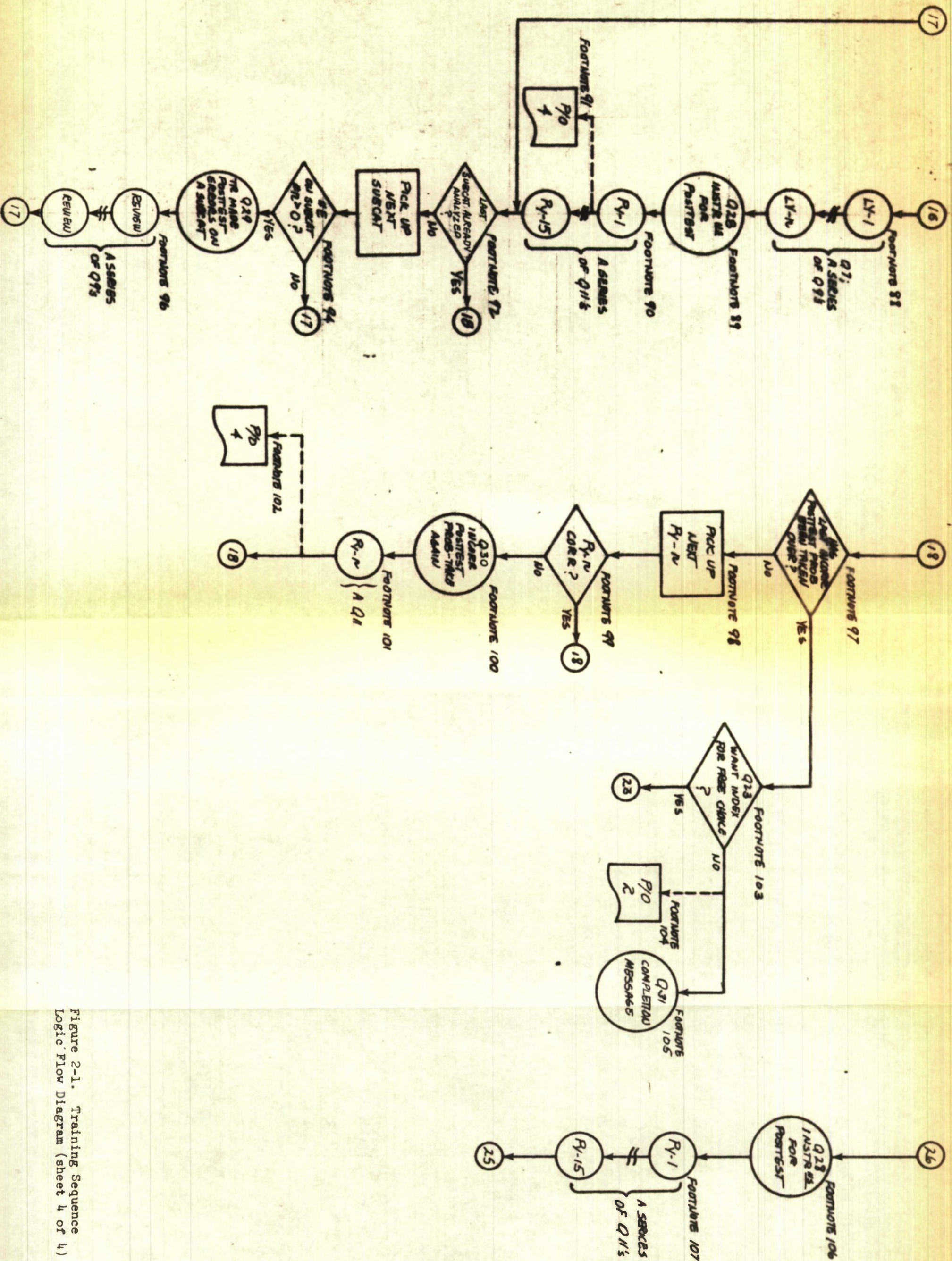


Figure 2-1. Training Sequence Logic Flow Diagram (sheet 4 of 4)

(Tables for Section II appear on the following pages)

Table 2-1

Criteria for Error-Evaluation of Trainee's
Performance on Any Subcategory for a PY Section

Trainee's Rating on the Subcategory	# Errors on Subcategory (on INDEPENDENT PY)	# Errors on Subcategory (on CUM PY)
Excellent	0	0
Good	1	1-2
Average	2	3
Poor	≥ 3	≥ 4

Table 2-2

Remedial Continuation for Each Combination of PY Section
 (Except for the Posttest), Trainee-Rating, and
 Subcategory; and, VALUE FOR LAST Y BEFORE POSTTEST

Subcategory	PY Section (LAST Y BEFORE POSTTEST = 19)			
	1st PY Section (INDEP) Trainee- Rating:	2nd PY Section (INDEP) Trainee- Rating:	3rd PY Section (CUMUL) Trainee- Rating:	...19th PY Section (INDEP) Trainee- Rating:
	GOOD LY = i = (one step)	GOOD LY = i = (one step)	GOOD LY = 1 or 2 i = (a step in one of the LY sections)	GOOD LY = i = (one step)
#1	AVG LY = i = (a sequence)	AVG LY = i = (a sequence)	AVG LY = 1,i=(a seq) LY = 2,i=(a seq)	AVG LY = i = (a sequence)
	POOR LY = i = (a sequence)	POOR LY = i = (a sequence)	POOR LY = 1,i=(a seq) LY = 2,i=(a seq)	POOR LY = i = (a sequence)
#2	Same type of specification as for #1			
⋮				
#120	Same type of specification as for #1			

Table 2-3

Remedial Continuation on Each Subcategory for Trainees Who
Have Completed the Posttest (Either for Posttest
Errors or for Free-Choice Review)

Subcategory	Remedial Continuation for Trainees Who Have Completed the Posttest
#1	LY = any CUMULATIVE LY section or the POSTTEST LY section <i>i</i> = a sequence repeated specification for a maximum of 7 (seven) LY sections
#2	Same type of specification as for #1
⋮	
#120	Same type of specification as for #1
#121 ¹	Same type of specification as for #1
⋮	
#135	Same type of specification as for #1

¹Remedial work on subcategories #121-135 is available only for free-choice review and these subcategories are available only after the trainee has completed the posttest (on Q4).

Table 2-4

Remedial Continuation (RX Sequence) for Each PX Section of an X Set

RX sequences are the specific frame numbers in the LX section of a particular X set (corresponding to the value of X); i always refers to the frame number of the set.

X=A	$\left\{ \begin{array}{l} i=--- \\ to=--- \end{array} \right\}$	Max # broken seqs for any X for review purposes = 1
X=B		
	i=---	
	to---	
X=C	i=---	
	to---	
X=D	i=---	
	to---	
X=E	i=---	
	to---	

Table 2-5

Possible Number of Errors on Each Analyzed Subcategory for
Each PY Section (There is one PY section in each Y set)

Subcategory	PY Section			
	PY for Set 1	PY for Set 2	PY for Set 3	... PY for Set 20 (PY = Posttest)
#1	(poss # E)	(poss # E)	(poss # E)	(poss # E)
#2	(poss # E)			
#3	(poss # E)			
#4	(poss # E)			
#5	(poss # E)			
⋮				
#120	(poss # E)			

Table 2-6

Possible Number of Errors for Each PX Section
and for Each Posttest Problem

Part 1) X sets:

Value of X =	Poss. # Errors for Each PX Section
A	_____
B	_____
C	_____
D	_____
E	_____

Part 2) Posttest Problems:

Problem #	Poss. # Errors for Each Problem & Total
1	_____
2	_____
3	_____
4	_____
5	_____
6	_____
7	_____
8	_____
9	_____
10	_____
11	_____
12	_____
13	_____
14	_____
15	_____
TOTAL	_____

Table 2-7

Student History Storage

(Data to be Stored Temporarily by the Computer at Appropriate Points,
as Specified by the Footnotes for the TSL Flow Diagram)

1. value for last CP (continuation point) _____
2. X = _____, i = _____
3. Y = _____, i = _____
4. value indicating problem type (value for INDEPENDENT or CUMULATIVE or POSTTEST)
5. # E on last PX (a running tally of errors for the PX section now being worked on) _____
6. subcategory now under analysis or for which the trainee is now taking remedial work _____
7. trainee's rating on subcategory specified in 6) above (value used to indicate EXCELLENT or GOOD or AVG or POOR)
8. value used to indicate the number of TRIES the trainee has had on a PY problem (e.g., TRY = 1 or 2) _____
9. value of n indicating the number of the posttest problem for which the first-try analysis has just been completed _____
10. # E on last PY section for each subcategory (a running tally of errors for each subcategory, which is deleted when the trainee starts on the next PY)

Subcategory	# E for last PY Section
1	_____
:	:
:	:
120	_____

Table 2-8

The Number of Pretest (X) Sets, Posttest Problems, and Subcategories

	<u>Number</u>
Pretest (X) Sets	_____
Posttest Problems	_____
Subcategories	_____

Section III

OPERATING PROCEDURES

This section describes the operating procedures for this capability. Included are integrated console operating procedures, and error detection and correction procedures. In addition, operational examples are provided to illustrate how the various elements of this capability are used to meet the requirements of training. Also included are a description of the overlay process step key functions and the procedural flow diagram for this capability.

3.1 Integrated Console Operating Procedures

The integrated console provides for operator-processor communication. For this capability, operator communications via the integrated console are conducted through the manipulation of console control keys, overlay process step keys, and logic control pushbuttons, and an electronic typewriter. The Integrated Console Control Panel, on which these various controls appear, is shown in Figure E-1. Display screens, and the line printer are used to present appropriate data outputs.

Each capability employs a separate overlay that, when used with the integrated console process step keys, presents to the operator the capability options. The overlay for this capability is shown in Figure 3-1. The function of each process step key associated with this capability overlay is described in Table 3-1. The logic control pushbutton functions are described in Table 3-2.

An example of each cue and printout that may be encountered in this capability is included at the end of Section III.

Section 3.1.1 contains the operating procedures for this capability, using the capability overlay and the integrated console. The possible sequences are illustrated in the procedural flow diagram contained in Appendix A.

3.1.1 Computer Directed Training Overlay Operating Procedures

The capability overlay shown in Figure 3-1 is designed so that when it is placed over the process step keys of the integrated console, the operator can perform the required tasks in the training sequence by responding to overlay indicator lights and to cues that appear on the console screen. Whenever an

overlay indicator light is on (e.g., L2), the operator may press the corresponding process step key (e.g., P2). Indicator lights are designated by the letter L and the corresponding position number (e.g., L10). Process step keys are designated by the letter P and the key number (e.g., P10).

During the retrieval sequence, the operator may legally press a process step key whenever the corresponding indicator light is on (i.e., he may press P10 only if L10 is on).

The operator may also respond, as necessary, to lighted console control keys and status lights. The functions and operation of these keys and lights are described in detail in 473L-OS-43: Operational Specification for the Integrated Console, Model II.

To employ the capability overlay, the operator places it in position over the integrated console process step keys and presses the START pushbutton. He may then press any process step key whose corresponding indicator light is on. Since any required uses of the capability overlay and the console keys are covered by the initial training sequences, essentially no prior knowledge is assumed for the trainee's use of this capability.

The following sections describe the logic sequences and operating procedures that are presented in the Procedural Flow Diagram for the Computer Directed Training Capability, in Figure A-1. A description of each cue and printout that is referenced below may be found in the appropriate figure at the end of this chapter. (The appropriate figure number for each cue and printout is provided on page xi of this operational specification.)

When the START pushbutton is pressed, the Introduction Cue, Q1 will be presented at the integrated console. This cue contains instructions explaining the initial options which are available when using the computer directed training overlay.

Any one of the operations below is available to the trainee or instructor at this time, and may be selected by pressing the corresponding process step key:

- a. TRAINEE (Section 3.1.1.1)
- b. PROFICIENCY MAINTENANCE (Section 3.1.1.2)
- c. INSTRUCTOR (Section 3.1.1.3)

The following sections cover the detailed step-by-step operating procedures for each of these options.

3.1.1.1 Trainee

When the TRAINEE option is selected, the Name and Serial Number cue (Q6) is presented at the integrated console. The trainee is required to type in his name and serial number and then to enter the cue.

The computer will use the specified serial number to determine if the trainee is a new or old trainee. An old trainee is one whose serial number has previously been entered on the Name and Serial Number cue (Q6); a new trainee is one whose serial number has not previously been entered on this cue. The next two sections cover the operating procedures for each of these contingencies.

3.1.1.1.1 New Trainee

In actuality, a new trainee would not complete training in one session. A trainee can stop at any time by pressing "TERMINATE TRAINING" and/or "COMPL OPER". However, for simplicity, the following text will describe the logical sequences and operating procedures that would be available to a New Trainee from beginning to end of the training program, as though he went through in one-pass. The variations from this one-pass sequence that may occur due to training interruptions are described by Section 3.1.1.1.2. Paragraph headings typed in all capital letters indicate major routines.

THE X SETS:

After entering the Name and Serial Number cue (Q6), a New Trainee will get the Instructions for Taking Training Materials cue (Q7). The trainee is required to read and then enter this cue. Then the first of the learning cues in Set-A, Section-1 (Q9's) will be presented to the trainee at the integrated console. Each of the Q9 cues will show his typed answer(s) to the problem on the preceding cue in the set, the correct answer, a new problem, and a place for him to type his answer(s) for this new problem. To obtain each successive cue in the section, the trainee types his answer(s) to the cue shown on the display screen and enters the cue. This procedure will continue until the trainee completes and enters the last Q9 in Set-A, Section-1.

After entering the last Q9 in Set-A, Section-1, the trainee will get the Progression to a PX Problem Section cue (Q10), which instructs the trainee in the use of the cues in Set-A, Section-2. The trainee is required to read this cue

and press "CONTINUE". Then the first of the learning cues in Set-A, Section-2 (Q8) will be presented. To obtain each successive cue in the section, the trainee types his answer(s) to the cue shown on the display screen and enters the cue. This procedure will continue until the trainee completes and enters the last Q8 in Set-A, Section-2.

After the trainee has entered the last Q8 in Set-A, Section-2, the computer determines whether the trainee's error rate on Set-A, Section-2 was more than 5%:

1) If it was, the trainee gets the Continuation After Excess Errors on a PX Section cue (Q12). The trainee is required to read this cue and press "CONTINUE". Then the first of the learning cues (Q9's) specified in the remedial sequence for Set-A (see Table 2-4) will be presented. To obtain each successive cue in the remedial sequence, the trainee types his answer(s) to the cue shown on the display screen and enters the cue. This procedure will continue until the trainee completes and enters the last Q9 in the remedial sequence for Set-A: at this point, the computer will determine whether Set-E has been completed (the last X set is E). Since Set-E has not been completed at this point (i.e., at the completion of Set-A), the trainee will then get Q7 and start on Set-B, and continue in the manner specified for Set-A. This procedure for THE X SETS will be repeated for each successive set until Set-E has been completed; then the trainee will start on the Y sets (see THE Y SETS, below).

2) If the trainee's error on Set-A was not more than 5%, the trainee gets the Continuation After Good Performance on a PX Section cue (Q13). The trainee is required to read this cue and press "CONTINUE". At this point, the computer will determine whether Set-E has been completed (the last X set is Set-E). Since Set-E has not been completed at this point, the trainee will then get Q7 and start on Set-B, and continue in the manner specified for Set-A. This procedure will be repeated for each successive set until Set-E has been completed; then the trainee will start on the Y sets (see THE Y SETS, below).

THE Y SETS:

The LINEAR TEACHING SECTION

At the start of the first Y set, the trainee will get the Instructions for Taking Training Materials cue (Q7), which he will read and enter. Then the first of the learning cues in Set-F, Section-1 (Q9's) will be presented to the trainee

at the integrated console. To obtain each successive cue in the section, the trainee types his answer(s) to the cue shown on the display screen and enters the cue. This procedure will continue until the trainee completes and enters the last Q9 in Set-F, Section-1.

After entering the last Q9 in Set-F, Section-1, the trainee will get the Progression to a PY Problem Section cue (Q14). The trainee is required to read this cue and press "CONTINUE" and he will get the first Q11 in Set-F (i.e., he will get the first Q11 in Set-F, Section-2).

THE PROBLEM SECTION:

THE FIRST (and each successive) Q11 IN SET-F (or any other Y set):

After the trainee reads Q17 and presses "CONTINUE", the first of the learning cues in Set-F, Section-2 (Q11's) will be presented. The trainee types his answer and enters the cue, and the computer determines whether his answer was correct:

1) If his answer to the first Q11 was correct, the trainee gets the Continuation After Correct Answer to a PY Problem cue (Q15), which he reads, and then he presses "CONTINUE" to get the next Q11 in Set-F, Section-2. He continues in the manner specified for the first Q11 in Set-F, Section-2 until all Q11's in Set-F have been completed; then his continuation is determined according to his group (see GROUP DETERMINATION AFTER SET-F, below).

2) If his answer to the first Q11 was not correct, the computer determines whether that was his first try on that Q11:

A) If that was his first try on the first Q11, he gets the Try Again Option cue (Q16). The trainee is required to indicate whether he wants to try the same problem again:

A-1) If he does want to try again, he gets the first Q11 for a second try, and proceeds in the manner specified for the first Q11, until all Q11's in Set-F have been completed. Then his continuation is determined according to his group (see GROUP DETERMINATION AFTER SET-F, below).

A-2) If he does not want to try the first Q11 again, the computer then determines whether the last Q11 in Set-F, Section-2 has been completed. Since at this point the trainee has just completed the first Q11 in Set-F, Section-2, the answer is no, and therefore the trainee will get the next Q11 in Set-F, Section-2, and proceed in the manner specified for the first Q11, until all Q11's in Set-F have been completed. Then his continuation is determined according to his group (see GROUP DETERMINATION AFTER SET-F, below).

B) If that was not his first try on the first Q11, he gets the Continuation After Two Unsuccessful Tries on a PY Problem cue (Q17), which he reads, and then he presses "CONTINUE". Then the computer determines whether the last Q11 in Set-F, Section-2 has been completed. Since at this point the trainee has just completed the first Q11 in Set-F, Section-2, the answer is no, and therefore the trainee will get the next Q11 in Set-F, Section-2, and proceed in the manner specified for the first Q11, until all Q11's in Set-F have been completed. Then his continuation is determined according to his group (see GROUP DETERMINATION AFTER SET-F, below).

GROUP DETERMINATION AFTER SET-F:

After all Q11's in Set-F have been completed, the computer determines whether the trainee is in Group A (see Section 2.2.3, footnote 13):

1) If he is not in Group A (he is in Group B), he gets the Introduction to Free-Form Practice Exercises cue (Q18) and starts on the Free-Form Practice Exercises for Set-F, i.e., he starts on Set-F, Section-3 (see FREE-FORM PRACTICE EXERCISES, SET-F, SECTION-3, below).

2) If the trainee is in Group A, the computer initiates the subcategory analysis (see SUBCATEGORY ANALYSIS FOR SET-F, SECTION-2, below).

SUBCATEGORY ANALYSIS FOR SET-F, SECTION-2:

First, the computer determines whether the last subcategory identified with the answers to the Q11's in Set-F, Section-2 has been analyzed for trainee errors (and, therefore, whether all forced remedial sequences have been taken):

A) If there are no more subcategories to be analyzed (i.e., the last subcategory identified with the answers to the Q11's in Set-F has already been analyzed), the trainee gets the Introduction to Free-Form Practice Exercises cue (Q18) and starts on the Free-Form Practice Exercises for Set-F, i.e., he starts on Set-F, Section-3 (see FREE-FORM PRACTICE EXERCISES, SET-F, SECTION-3, below).

B) If there are more subcategories to be analyzed, the computer picks up the next subcategory identified with the answers to the Q11's in Set-F and determines the trainee's rating on this subcategory:

B-1) If the trainee was rated GOOD, but not EXCELLENT, on that subcategory (based on the number of errors and whether Set-F was INDEPENDENT or CUMULATIVE -- see Table 2-1), he will be given a remedial practice problem (see FORCED REMEDIAL (A), below).

B-2) If the trainee was rated AVERAGE on that subcategory, he will be given a remedial review sequence (see FORCED REMEDIAL (B), below).

B-3) If the trainee was rated POOR on that subcategory, he will be given a remedial text sequence (see FORCED REMEDIAL (C), below).

B-4) If the trainee was not POOR (nor AVERAGE nor GOOD), he was rated EXCELLENT on that subcategory, and the computer will initiate the SUBCATEGORY ANALYSIS for the next subcategory.

FORCED REMEDIAL

A) PRACTICE PROBLEM

The trainee will get feedback by way of the Subcategory Fairly Good cue (Q26). Then he will press "CONTINUE" to get one practice problem, a Linear Training Step cue (Q9), on the subcategory just analyzed. After he types his answer(s) and enters this cue, the computer determines whether his answer was correct:

1) If his answer was correct, he has completed his remedial work for that subcategory, and the computer will initiate the SUBCATEGORY ANALYSIS for the next subcategory.

2) If his answer was not correct, he gets the Incorrect Answer to a Practice Problem cue (Q27). He reads this cue and presses "CONTINUE" and then he is given the remedial review sequence for that subcategory (see FORCED REMEDIAL (B), below).

B) REVIEW SEQUENCE

The trainee will get the Subcategory Average cue (Q25). He reads this cue and presses "CONTINUE" and then he gets the first Linear Training Step cue (Q9) in the review sequence specified for the particular set and subcategory just analyzed and a rating of AVERAGE (see Table 2-2). He types his answer(s) to this cue and presses "ENTER" to get the next Q9. This continues until he has completed all Q9's in the review sequence. Then the computer will initiate the SUBCATEGORY ANALYSIS for the next subcategory.

C) TEXT SEQUENCE

The trainee will get the Subcategory Poor cue (Q24). After he reads this cue and presses "CONTINUE", he gets the first Linear Training Step cue (Q9) in the text sequence. He types his answer(s) and enters this Q9 to get the next Q9; this continues until all Q9's in the sequence are done. Then the computer initiates the SUBCATEGORY ANALYSIS again.

FREE-FORM PRACTICE EXERCISES, SET-F, SECTION-3:

After the trainee (in either Group A or Group B) reads the Introduction to Free-Form Practice Exercises cue (Q18) and presses "CONTINUE", he gets the first Free-Form Practice Exercise cue (Q19). He types his answer and presses "ENTER". His answer is printed out on the line printer, and the appropriate Free-Form Practice Exercise Answer cue (Q19A) is displayed to him. He reads this cue and presses "CONTINUE" to get the next Q19. This procedure continues until all Q19's in Set-F, Section-3 have been completed. Then the trainee gets the Free-Choice Review Option cue (Q20). If he wishes to take review in some subcategory, he presses "FREE CHOICE". Otherwise, he presses "CONTINUE".

If he presses "FREE CHOICE", he is given the Q21 - FREE CHOICE REVIEW routine (see below).

If he presses "CONTINUE", the computer determines whether there are any more Y sets left before the POSTTEST Y set:

1) If there are, the trainee is started on the next Y set and follows the procedure specified above for the Y SETS; this procedure will continue for the successive Y SETS, F through X; at the completion of Y SET = X, the trainee will then start on the POSTTEST set.

2) If there are not, the trainee is started on the Linear Training section of the POSTTEST set (see POSTTEST Y SET, below).

Q21 - FREE CHOICE REVIEW

The trainee will get the Index for Free Choice Review for Trainees Who Have Not Completed the Program cue (Q21). The trainee types the code for the subcategory he wants to review and presses "ENTER". Then he gets the Instructions for Taking Free-Choice Review cue (Q22). After he reads this cue and presses "CONTINUE", he gets the first review step in the sequence appropriate to the subcategory chosen, a Linear Training Step cue (Q9). He reads this cue, types his answer(s) and presses "ENTER" to receive the next Q9. This procedure continues until he has completed all of the Q9's in the review sequence appropriate to the subcategory chosen, or, until he presses "SKIP". In either case, he is then given the Free Choice Review Option cue (Q20) again: If he wants review on another area, he presses "FREE CHOICE" and he goes through the above procedure for another subcategory; otherwise, he presses "CONTINUE" and the computer determines whether there are any more Y sets left before the POSTTEST Y set:

1) If there are, the trainee is started on the next Y set and follows the procedure specified above for the Y SETS; this procedure will continue for the successive Y SETS, F through X; at the completion of Y SET = X, the trainee will then start on the POSTTEST set.

2) If there are not, the trainee is started on the Linear Training section of the next POSTTEST set, which reviews all QL materials covered by the program (see POSTTEST Y SET, below).

POSTTEST Y SET:

LINEAR TRAINING SECTION

First, the trainee gets the Instructions for Taking Training Materials cue (Q7), which he reads and enters. Then he gets the first Linear Training Step cue (Q9) in the training section. To obtain each successive cue in the section, the trainee types his answer(s) to the cue shown on the display screen and enters the cue. This procedure continues until all Q9's in this section are done. Then the trainee gets the Instructions for Taking Posttest cue (Q28). He reads this cue and presses "CONTINUE" and gets the first Problem to be Analyzed (Q11).

PROBLEM SECTION

He types his answer(s) and presses "ENTER", his answer is printed out on the line printer and the computer determines whether he has completed the last Q11 in the POSTTEST.

1) If the last Q11 in the POSTTEST has not yet been taken, the trainee gets the next Q11.

2) If the last Q11 has been taken, the computer initiates the subcategory analysis for the POSTTEST (see SUBCATEGORY ANALYSIS FOR POSTTEST, below).

SUBCATEGORY ANALYSIS FOR POSTTEST

First, the computer determines whether there are any more POSTTEST subcategories to be analyzed:

1) If there are not, the trainee is given the POSTTEST TRY-AGAIN sequence (see below).

2) If there are more POSTTEST subcategories to be analyzed, the computer picks up the next subcategory and determines whether the trainee had any errors on that subcategory.

a) If he had no errors on that subcategory, he re-enters the SUBCATEGORY ANALYSIS FOR POSTTEST for the next subcategory.

b) If he had any errors on that subcategory, he gets a remedial review sequence on that subcategory: he gets the Errors Were Made on a Posttest Subcategory cue (Q29). He reads this and presses "CONTINUE" to get the first Linear Training Step cue (Q9) in the sequence. He types his answer(s) to this cue and enters it to get the next Q9. This continues until all Q9's in the sequence have been done. Then the computer initiates the SUBCATEGORY ANALYSIS FOR POSTTEST for the next subcategory.

POSTTEST TRY-AGAIN

The computer determines whether the trainee's last incorrect POSTTEST problem has been taken over:

1) If all incorrect POSTTEST problems have been taken over, the trainee is given the OPTION OF FREE-CHOICE REVIEW AFTER THE POSTTEST (see below).

2) If the trainee has not tried again every POSTTEST problem that was missed, he will now get the last one again: first he gets the Incorrect Posttest Problem - Try Again cue (Q30). He reads this and presses "CONTINUE" and gets the last incorrect Q11 again. He types his answer and enters the cue. A printout is made of his answer and he returns to the POSTTEST TRY-AGAIN routine.

OPTION OF FREE-CHOICE REVIEW AFTER THE POSTTEST

The trainee gets the Option of Selecting an Area for Review cue (Q23). If the trainee wants to review an area, he presses "FREE CHOICE". If not, he presses "CONTINUE".

If he presses "CONTINUE", he is through with all training materials: a printout is made of his trainee data and he gets the Completion Message cue (Q31). After he reads this cue, he presses "COMPL OPER".

If he presses "FREE CHOICE" he gets the Index for Free Choice for Trainees Who Have Completed the Program cue (Q4). He types the code for the subcategory he wants to review and enters this cue. Then he gets the Instructions for Taking Free Choice Review cue (Q22). He reads this cue and presses "CONTINUE". Then he gets the first Linear Training Step cue (Q9) in the review sequence. He types his answer(s) to this cue and enters it, and gets the next Q9. This continues

until all Q9's in the sequence are done, or until the trainee presses "SKIP". In either case, the trainee is given the Option of an Area for Review cue (Q23) again. The procedure for Q23 described above will be repeated until the trainee presses "CONTINUE", at which time he will get the Completion Message cue (Q31). After he reads this cue, he presses "COMPL OPER".

3.1.1.1.2 Old Trainee

Anytime a new trainee stops his work on the computer directed training program, at whatever point, he is considered an old trainee when he comes back on for more training.

Most cues used for this capability specify that if a trainee wishes to stop, for however long, he should press "TERMINATE TRAINING" and he is then given the Complete Operation cue (Q32), which instructs him to press "COMPL OPER". A few cues allow the trainee to stop just by pressing "COMPL OPER". However, the latter option is appropriate only when no data are still being stored for the trainee; otherwise, to ensure that all data obtained for a trainee are stored, the "TERMINATE TRAINING" key should be pressed before "COMPL OPER".

If a trainee presses "TERMINATE TRAINING" and then "COMPL OPER", the storage of his data will be completed and the computer will also store a flag to indicate the continuation point in the training sequence at which the trainee stopped (i.e., the cue that was present when he stopped) and to which he should return when he comes back on.

If data are being stored for a trainee during a training session, and he does not follow the correct procedure of pressing "TERMINATE TRAINING" and then "COMPL OPER", his data on the last incomplete set of materials will be lost, because unless "TERMINATE TRAINING" is pressed the computer only updates a trainee's storage at the end of each training set. Thus, if the trainee does not press "TERMINATE TRAINING" before he presses "COMPL OPER", then when he comes back, he must start over again at the beginning of the last incomplete set. However, this is an anomalous variation, which should not occur if proper operating procedures are used.

If proper operating procedures are used, there are two types of continuations for an Old Trainee. A description and an example of each of these two continuation-types are given below:

Continuation 1. In general, the computer stores the alphabetic value of the set and the number of the cue within that set for the cue that was present when the trainee went off the computer. Therefore, except for the case specified in Continuation 2 below, the Old Trainee will start with the cue that was present when he went off the computer at the end of his last training session.

EXAMPLE: See Figure A-1, sheet 2, under connector (2). If the trainee got off when the Q11 that was present had a set-and-number code of G086, then when he comes back on, this same Q11 (G086) will be presented to him again.

Continuation 2. If the trainee left in the middle of a remedial sequence, then when he comes back on, he will have to start over again at the beginning of that remedial sequence. This is true for both forced remedial sequences and sequences being used for free-choice review.

EXAMPLE: See Figure A-1, sheet 3. If the trainee left when one of the Q9's in a sequence accessed through Q21 is present, then when he comes back on, he will start at the beginning of that remedial sequence. Thus, suppose the trainee was taking the remedial sequence specified for the first PY section, on subcategory #1, for AVG trainees (see Table 2-2); then when he comes back on, he will start at the beginning of the sequence specified for those conditions (PY, subcategory, and rating).

3.1.1.2 Proficiency Maintenance

When the Proficiency Maintenance option is selected, the Name and Serial Number cue (Q6) is presented. After entering the Name and Serial Number cue (Q6), the Directions for Proficiency Maintenance Trainee cue (Q2) advises this trainee that he has two options: he can choose to take a self-evaluative test and/or he can take remedial work. If he wants to take the test at this time, he presses "POSTTEST"; if he wants remedial work, he presses "FREE CHOICE".

3.1.1.2.1 POSTTEST

If the Proficiency Maintenance (P-M) trainee presses "POSTTEST", the Instructions for Taking Posttest cue (Q28) is presented. The P-M trainee reads this cue and then presses "CONTINUE" to obtain the first POSTTEST problem, by means of a QL Problem for Analysis cue (Q11). The P-M trainee reads this cue, types his answers and presses "ENTER". Since he is a P-M trainee, his answers are used only

for self-evaluation, not for computer error-analysis, and he immediately gets the next QL Problem for Analysis cue (Q11), for which he types his answers and presses "ENTER". This procedure continues until the P-M trainee has completed all of the Q11's on the POSTTEST. Then he is returned to his third-level option: i.e., the Directions for Proficiency Maintenance Trainee cue (Q2) is presented.

3.1.1.2.2 FREE CHOICE

If the P-M trainee presses "FREE CHOICE", he gets the Index for Free Choice Review for Trainees Who Have Completed the Program cue (Q4). On this cue, he types the code for the subcategory which he wishes to review, and presses "ENTER". Then he gets the Instructions for Taking Free Choice Review cue (Q22). He reads this cue and presses "CONTINUE", which presents the first review step in the sequence appropriate to the subcategory chosen, a Linear Training Step cue (Q9). He reads this cue, types his answers, and presses "ENTER" to receive the next Q9. This procedure continues until he has completed all of the Q9's in the review sequence appropriate to the subcategory chosen, or, until he presses "SKIP". In either case, he is then given the Free Choice Review Option cue (Q20) again. If he wants review on another area, he presses "FREE CHOICE" and he goes through the Free Choice procedure for another subcategory; otherwise, he presses "CONTINUE" and gets the Directions for Proficiency Maintenance cue (Q2) again, which provides both the FREE CHOICE option and the POSTTEST option.

3.1.1.3 INSTRUCTOR

When the INSTRUCTOR option is selected, a cue with Directions for Obtaining Trainee Data or Updating Training Sets (Q3) is presented. If the instructor wishes to obtain data for a specified trainee, either for a printout or for deletion, he presses "INDIVIDUAL TRAINEE" to obtain further instructions; if he wants data for all trainees, he presses "SUMMARY"; if he wants to modify the training materials, he presses "UPDATE TRAINING MATERIALS"; if he wants a printout of the contents of all cues, he presses "CUE FILE MATRIX"; if he wants a printout of the criteria used for evaluation of errors and assignment of ratings, he presses "CRITERIA MATRIX"; if he wants a printout of the remedial continuations used for excess errors and free choice review, he presses "EVALUATION CONTINUATION MATRIX"; if he wants a printout of the possible number of errors on each subcategory for each PY section; on each PX section; and on each Posttest problem, he presses

"ERROR MATRIX"; or, if he wants a printout of the number of PRETEST (X) sets, POSTTEST problems, and subcategories, he presses "FLEX COURSE".

3.1.1.3.1 SUMMARY

If the instructor presses "SUMMARY", summary data for all trainees will be printed out on the line printer as P/O 2.

3.1.1.3.2 INDIVIDUAL RECORD

If the instructor presses "INDIVIDUAL TRAINEE", a cue with Directions for Obtaining or Deleting Data on an Individual Trainee (Q5) is presented. The instructor is required to type the name and serial number of the individual trainee whose data he's concerned with. If he wants a printout, he types this information and then he enters the cue; the data will be obtained on a P/O 2. If he wants to delete the trainee's data, he types the name and serial number and he types an asterisk in a specified location, and then he enters the cue.

If the instructor presses "UPDATE TRAINING MATERIALS", the set of cards prepared for this purpose will be read in and, if necessary, the tape that was mounted will be used. (The procedures for updating the training materials will be described in a separate report prepared by IBM.) When the updating has been completed, the Update Feedback Message (Q34) will be presented to the instructor to indicate that the updating is complete. After any one of the above options is completed, the instructor is returned to second-level options, i.e., Q3 is represented to him on the display screen.

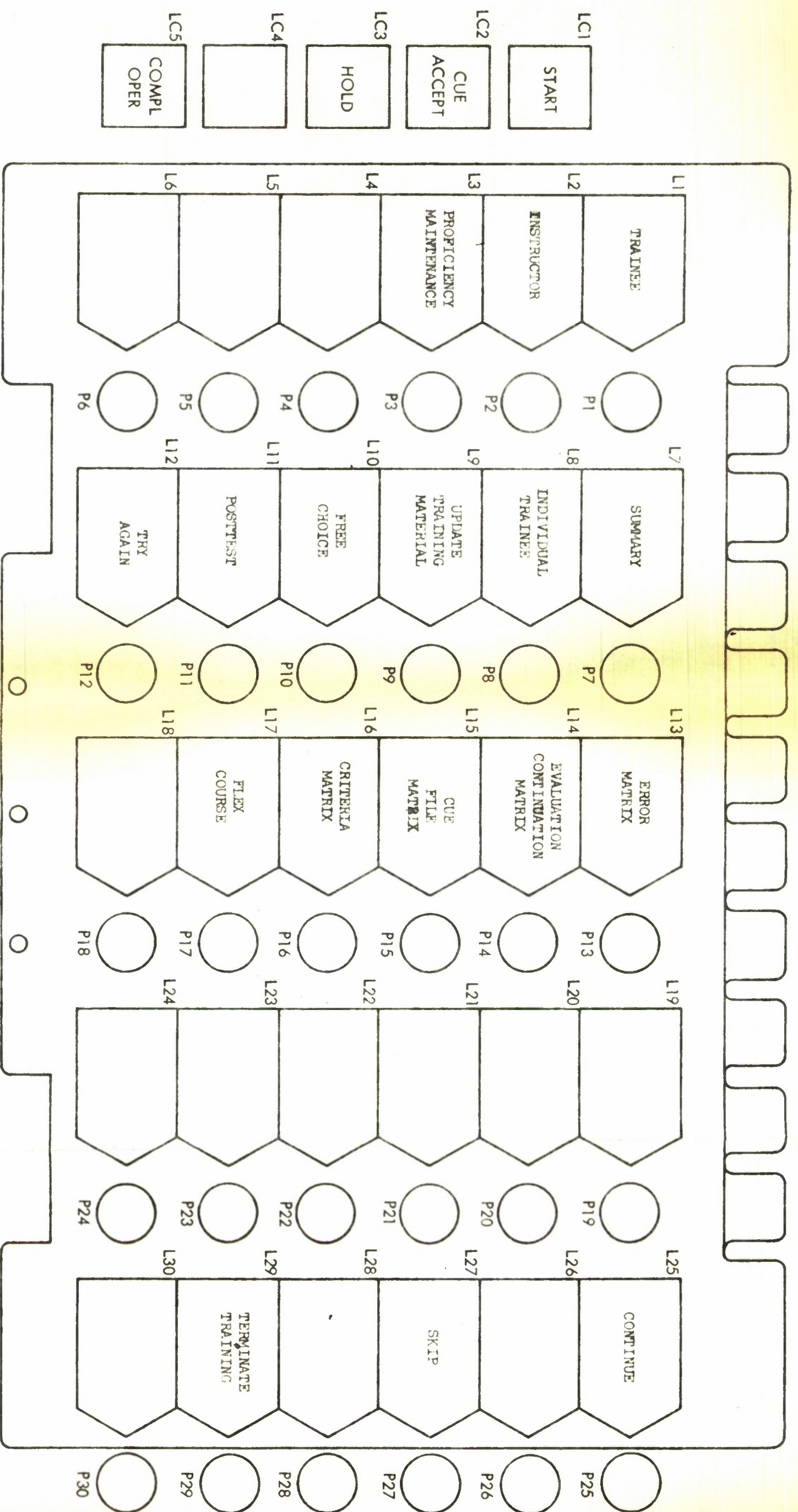
3.2 Error Detection and Correction Procedures

Since QL statements will not be entered for data retrieval in this capability, trainee errors in developing Query Language statements will not cause an error message to be generated. The answer for each problem is canned and when computer error-evaluation is required, it is done (by a matching process) only for the purpose of determining appropriate remedial work. Therefore, the CHECKER subprogram will not be utilized by this capability.

It is possible for an error to occur while a trainee or instructor is using this capability which does not fall into the category of training evaluation. Therefore, checks have been built into the program to detect these errors. The following list summarizes the detectable errors and identifies the message which will be presented on lines 34, 35, and 36 of the cue on which the trainee or instructor is advised of the error condition.

CUES	ERROR MESSAGES
Q3 Q33	EM-1. THE TAPE REQUIRED IS NOT AVAILABLE OR AN ERROR HAS BEEN ENCOUNTERED ON TAPES. CONTACT THE COMPUTER OPERATOR FOR ADDITIONAL INFORMATION.
Q3	EM-2. AN ERROR HAS BEEN DETECTED IN THE UPDATE CARDS OR AN ERROR HAS BEEN ENCOUNTERED READING CARDS. CONTACT THE COMPUTER OPERATOR FOR ADDITIONAL INFORMATION.
Q5	EM-3. THE PERSON IDENTIFIED IS NOT A TRAINEE AT THIS TIME.
Q4 Q21	EM-4. AN ILLEGAL SUBCATEGORY NUMBER HAS BEEN ENTERED. CORRECT ENTRY AND ENTER.

Error situations and correction procedures that are unique to common console controls are described in 473L-OS-43: Operational Specification for the Integrated Console, Model II.



Note: Indicator and control reference numbers do not appear on the overlay or on the console.

Figure 3-1. Computer Directed Training Overlay

Table 3-1. Computer Directed Training Overlay Process Step Key
Functions (sheet 1 of 4)

Key Designation	Function
L1 <div data-bbox="250 449 440 569" style="border: 1px solid black; padding: 5px; display: inline-block;"> TRAINEE </div>	<p>This key signals the program that the operator wants to start or continue training on the CDT program. When this key is pressed, the Name and Serial Number Entry cue (Q6) appears on the display screen.</p>
L2 <div data-bbox="250 722 440 842" style="border: 1px solid black; padding: 5px; display: inline-block;"> INSTRUCTOR </div>	<p>This key signals the program that the operator wants to either obtain trainee data (for printout or deletion) or to update training materials. When this key is pressed, the Directions for Obtaining Data or Updating cue (Q3) appears on the display screen.</p>
L3 <div data-bbox="250 995 440 1115" style="border: 1px solid black; padding: 5px; display: inline-block;"> PROFICIENCY MAINTENANCE </div>	<p>This key signals the program that the operator wants some of the CDT materials that are available for proficiency maintenance. When this key is pressed, the Name and Serial Number Entry cue (Q6) appears on the display screen.</p>
L7 <div data-bbox="250 1234 440 1354" style="border: 1px solid black; padding: 5px; display: inline-block;"> SUMMARY </div>	<p>This key signals the program that the operator wants P/O 1, the line printer printout of Summary Data for all trainees (except P-M). When this key is pressed, printout #1 will be printed out.</p>
L8 <div data-bbox="250 1486 440 1606" style="border: 1px solid black; padding: 5px; display: inline-block;"> INDIVIDUAL TRAINEE </div>	<p>This key signals the program that the operator wants to obtain data for an individual trainee, either on a printout or for deletion. When this key is pressed, the Directions for Obtaining or Deleting Data on an Individual Trainee cue (Q5) appears on the display screen.</p>
L9 <div data-bbox="250 1766 440 1885" style="border: 1px solid black; padding: 5px; display: inline-block;"> UPDATE TRAINING MATERIAL </div>	<p>This key signals the program that the operator wants to update some of the training materials (i.e., the content of some of the cues). The process for implementing this update capability will be described in a separate report prepared by IBM.</p>

Table 3-1. Computer Directed Training Overlay Process Step Key
Functions (sheet 2 of 4)

Key Designation	Function
L10 <div>FREE CHOICE</div>	This key signals the program that the operator wants to take remedial work in one or more areas. When this key is pressed, either the Index for Free-Choice Review for Trainees Who Have Not Completed the Program (Q21) or the Index for Free-Choice Review for Trainees Who Have Completed the Program (Q4) will appear on the display screen, depending on whether the trainee has completed the posttest or not.
L11 <div>POSTTEST</div>	This key signals the program that a proficiency maintenance trainee wants to take the posttest (the very last PY section, in the last set, Y = 20). When this key is pressed, the first cue in the posttest (a Q11) will appear on the display screen.
L12 <div>TRY AGAIN</div>	This key signals the program that the operator wants to take the last-presented problem again. When this key is pressed, the last problem in the PY section being worked on, which is a problem cue requiring computer error-analysis of the trainee's answer(s) (a Q11) will re-appear on display screen.
L13 <div>ERROR MATRIX</div>	This key signals the program that for updating purposes, the instructor wants to obtain P/08, the Possible Number of Errors on Each Subcategory for Each PY Section; on Each PX Section; and on Each Posttest Problem (the data specified in Tables 2-5 and 2-6). When this key is pressed, printout #8 will be printed out on the line printer. This printout will be described by IBM in a separate report.
L14 <div>EVALUATION CONTINUATION MATRIX</div>	This key signals the program that for updating purposes, the instructor wants to obtain P/07, Remedial Continuations (the data specified in Tables 2-2, 2-3, and 2-4). When this key is pressed, printout #7 will be printed out on the line printer. This printout will be described by IBM in a separate report.

Table 3-1. Computer Directed Training Overlay Process Step Key
Functions (sheet 3 of 4)

Key Designation	Function
L15 <div data-bbox="256 436 433 564" style="border: 1px solid black; padding: 5px; display: inline-block;"> CUE FILE MATRIX </div>	<p>This key signals the program that for updating purposes, the instructor wants to obtain P/05, Cues (the contents for all cues). When this key is pressed, printout #5 will be printed out on the line printer. This printout will be described by IBM in a separate report.</p>
L16 <div data-bbox="256 720 433 840" style="border: 1px solid black; padding: 5px; display: inline-block;"> CRITERIA MATRIX </div>	<p>This key signals the program that for updating purposes, the instructor wants to obtain P/06, Criteria (the data specified in Table 2-1). When this key is pressed, printout #6 will be printed out on the line printer. This printout will be described by IBM in a separate report.</p>
L17 <div data-bbox="256 1008 433 1127" style="border: 1px solid black; padding: 5px; display: inline-block;"> FLEX COURSE </div>	<p>This key signals the program that for updating purposes, the instructor wants to obtain P/09, FLEX COURSE, which specifies the number of PRETEST (X) sets, the number of POSTTEST problems, and the number of subcategories (the data specified in Table 2-8). When this key is pressed printout #9 will be printed out on the line printer. This printout will be described by IBM in a separate report.</p>
L25 <div data-bbox="256 1379 433 1499" style="border: 1px solid black; padding: 5px; display: inline-block;"> CONTINUE </div>	<p>This key signals the program that either the operator does not wish to exercise any special training options available at this time or, none are available. When this key is pressed, the next cue that is available in queue (without branching out to pick up cues that are not presently stacked up) will appear on the display screen. The type of cue that is presented will vary from one training point to another.</p>

Table 3-1. Computer Directed Training Overlay Process Step Key
Functions (sheet 4 of 4)

Key Designation	Function
L27 <div>SKIP</div>	<p>This key signals the program that the operator does not wish to complete the remedial sequence on which he is now working. When this key is pressed, the trainee will be sent to the same continuation point that he would have reached had he completed the remedial sequence: if the trainee is still in training on the CDT program and he has not yet taken the posttest, or if he is a proficiency maintenance trainee, Q20 will appear on the display screen; if the trainee has just completed the CDT program including the posttest, Q23 will appear on the display screen.</p>
L29 <div>TERMINATE TRAINING</div>	<p>This key signals the program that the trainee is going to stop work on the CDT program at the present time. When this key is pressed, Q32 will appear on the display screen, and the storage of data for a trainee on the work done so far on a set will continue until storage is complete.</p>

Table 3-2. Logic Control Pushbutton Functions (sheet 1 of 2)

Pushbutton Designation	Function
LC1	<div data-bbox="277 363 482 493" style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;">START</div> <p>This pushbutton lights when the operator positions the overlay. If the operator presses this pushbutton when it is lighted, he will be able to activate the overlay process step keys.</p>
LC2	<div data-bbox="277 710 482 840" style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;">CUE ACCEPT</div> <p>This pushbutton enables the operator to make Query Language entries, review the contents of the ET storage area, and accept or send a message during the time delay between pressing the overlay logic key and the receipt of the requested cue. When the program-generated cue is available, the CUE ACCEPT pushbutton lights. The operator can then view the cue by pressing this pushbutton. This action will also cause the previously displayed cue to be lost.</p>
LC3	<div data-bbox="277 1157 482 1287" style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;">HOLD</div> <p>This pushbutton permits the operator to work partially through an overlay, remove it, use another overlay, and return to the original overlay at the point at which the operation stopped. To return to this position, the operator presses the START pushbutton once. If START is pressed twice the program will cycle to the starting point of the overlay.</p>
LC4	<div data-bbox="277 1476 482 1604" style="border: 1px solid black; width: 124px; height: 60px; display: inline-block;"></div> <p>This is a spare pushbutton not presently used in this operational specification; it is available for future use.</p>

Table 3-2. Logic Control Pushbutton Functions (sheet 2 of 2)

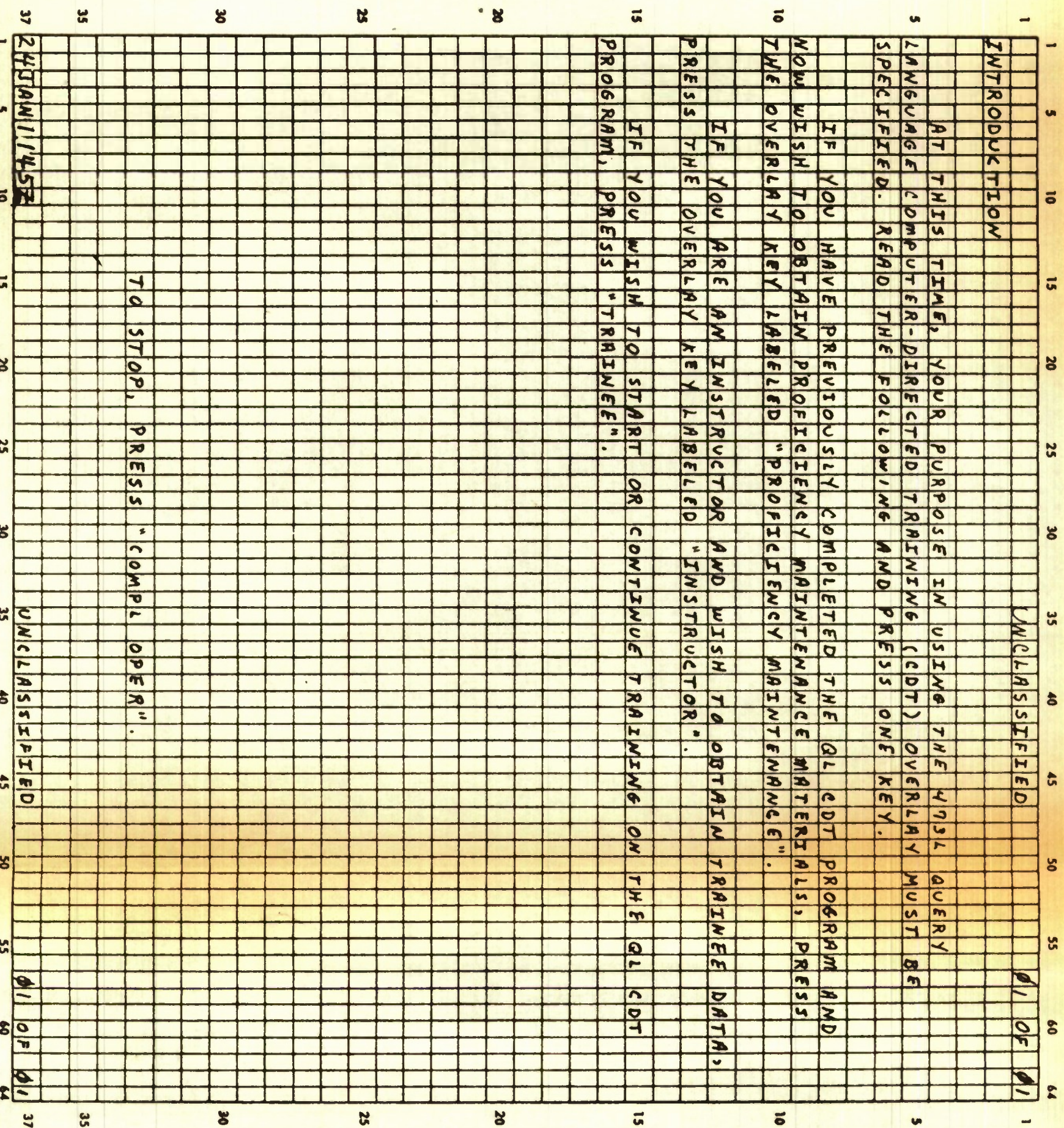
Pushbutton Designation

Function

LC5

COMPL
OPER

This pushbutton will notify the program that the operator has completed working with the overlay presently in place. Pressing this pushbutton will have the effect of terminating the operation of the overlay and releasing any storage area temporarily assigned to the overlay program. If any program that results in a display or printout is being executed when the COMPL OPER pushbutton is pressed, that program will run to completion (including any output), or until an error is detected, before the release of the storage area occurs.



PURPOSE: to direct the operator to the option appropriate to his purpose in using the Q1 CDT overlay.

Figure 3-2. Introduction
(a cue) - Q1

to advise the proficiency maintenance trainees his available options and how to obtain the desired one.

TO STOP, PRESS "TERMINATE TRAINING".

Figure 3-3. Directions
for Proficiency Maintenance
Trainee (a cue) - Q2

1 DIRECTIONS FOR INSTRUCTORS UNCLASSIFIED 01 OF 01

5 IF YOU WISH DATA FOR A PARTICULAR TRAINEE, YOU WILL OBTAIN FURTHER INSTRUCTIONS FOR OBTAINING THIS DATA IF YOU PRESS "INDIVIDUAL TRAINEE".

10 IF YOU WISH DATA FOR ALL TRAINEES COMBINED, TO BE PRINTED OUT ON THE LINE PRINTER, PRESS "SUMMARY".

15 IF YOU WISH TO UPDATE THE TRAINING MATERIALS, CONTACT THE COMPUTER OPERATOR WITH INSTRUCTIONS TO PLACE CARDS IN THE READER AND MOUNT TAPES, IF REQUIRED, PRIOR TO PRESSING "UPDATE TRAINING MATERIALS". THEN PRESS "UPDATE TRAINING MATERIALS".

20 IF YOU WANT A PRINTOUT OF THE CONTENTS OF ALL CUES, HAVE THE OPERATOR MOUNT TAPES. THEN PRESS "CUE FILE MATRIX".

25 TO OBTAIN A PRINTOUT OF THE CRITERIA USED FOR EVALUATION OF ERRORS AND ASSIGNMENT OF RATINGS, PRESS "CRITERIA MATRIX".

30 TO OBTAIN A PRINTOUT OF THE REMEDIAL CONTINUATIONS USED FOR EXCESS ERRORS AND FREE CHOICE REVIEW, PRESS "EVALUATION CONTINUATION MATRIX".

35 TO OBTAIN A PRINTOUT OF THE POSSIBLE NUMBER OF ERRORS ON EACH SUBCATEGORY FOR EACH PY SECTION, ON EACH PX SECTION, AND ON EACH POSTEST PROBLEM PRESS "ERROR MATRIX".

40 TO OBTAIN A PRINTOUT OF THE NUMBER OF X SETS, POSTTEST PROBLEMS, AND SUBCATEGORIES, PRESS "FLEX COURSE".

45 TO STOP, PRESS "COMPL OPER".

50 UNCLASSIFIED 01 OF 01

55 24JAN/1145R

PURPOSE:

to permit the instructor to obtain two types of Training Data Summaries (1) per trainee and 2) for all trainees), to achieve updating, and to look at the current contents of the CUE FILE matrix, the CRITERIA matrix, the EVALUATION CONTINUATION matrix, the ERROR matrix, and the FLEX COURSE matrix.

Figure 3-4. Directions for Instructors (a cue)

- Q3.

1	INDEX FOR FREE-CHOICE REVIEW:	UNCLASSIFIED	01 OF 46
5	CHOOSE THE SUBCATEGORY THAT YOU WISH TO REVIEW FIRST. ()		
10	TYPE SUBCATEGORY CODE AND PRESS "ENTER". TYPE CODE: ()		
15	GEN CAT () SUBCAT- ()	SUBCATEGORY DESCRIPTION	
20	PROG IND	RETRIEVE	
25	FILE IND	FILE INDICATOR	
30		FILE INDICATORS USED WITH GRID	
35		USE OF DATA CONTROL MANUAL	
40	CONTROL ROWS	COMBINATIONS	
45	QUALIFIER	SIMPLE QUALIFIER	
50		FORMAT OF COMPOUND QUALIFIER	
55		RELATIONS OF COMPOUND QUALIFIER	
60	MODIFIERS	MODIFIERS	
65	ATTRIBUTES	CONTROL ATTRIBUTES	
70		SUBCONTROL ATTRIBUTES	
75		TYPE 1 ATTRIBUTES	
80		TYPE 3 ATTRIBUTES	
85		TYPE 5 ATTRIBUTES	
90		COMPUTED ATTRIBUTES	
95		NON-COMPUTED ATTRIBUTES	
100	COMPARATORS	USE OF DATA CONTROL MANUAL	
105		COMPARATORS	
110		COMPARATORS WITH HIGH AND LOW VALUES	
115	VALUES	NON-COMPUTED VALUES	
120		MULTIPLE VALUES	
125		BLANK	
130		HIGH AND LOW VALUES	
135		AVAILABILITY DESIGNATIONS	
140		APPLICABILITY DESIGNATIONS	
145	TO SEE THE NEXT PAGE, PRESS "NEXT PAGE".		
150	TO STOP, PRESS "TERMINATE TRAINING".		
155	24 JAN 1952	UNCLASSIFIED	01 OF 46

PURPOSE: to permit the trainee who has completed the program (i.e., he has either just completed the posttest and the subsequent required remedial work or he is now a proficiency maintenance trainee) to choose an area (a subcategory) for review.

FORMAT:

- 1) This cue is "canned" -- i.e., it will not be generated by the computer program. If the trainee enters a cue on which he made an error in typing, the cue will be retyped without an error message appearing on page 1.
 - 2) Typing: For any one presentation, the trainee can only type on one page and only on line 5, in columns 55-57. Any number from 001 to 135 may be typed in these columns; only numerical digits will be legitimate and only numbers not exceeding 135. Leading zeros are optional; if leading zeros are omitted, the positioning of the number in columns 55-57 is not important.
- If the trainees type a number on more than one page of this cue, all but the first number will be ignored.

FOOTNOTES:

- 1) The trainee will obtain "review" materials from any of the 7 (seven) cumulative LY sets.
- 2) The code is the same as the subcategory-number specified on this Index, except that leading zeros may be omitted and, if leading zeros are omitted, positioning is optional.
- 3) A GEN CAT is a broad descriptive category that usually encompasses several subcategories. These are specified to guide the trainee's search for a subcategory that he wishes to review.
- 4) On q4, there are 135 subcategories: the first 120 are those that undergo error-analysis on problem sets at points throughout the program; the last 15 do not undergo analysis on problem sets (they do not involve specific elements of QL statements) but they are topics that the trainee might wish to review simply to refresh his general, background information.

Figure 3-5. Index for Free-Choice Review for Trainees Who Have Completed the Program (a cue) - q4 (Sheet 1 of 6)

1	5	10	15	20	25	30	35	40	45	50	55	60	64
1	INDEX	FOR	FREE-CHOICE	REVIEW:			UNCLASSIFIED					02 OF 06	
5	CHOOSE	THE	SUBCATEGORY	THAT	YOU	WISH	TO	REVIEW	FIRST.				
	TYPE	SUBCATEGORY	CODE	AND	PRESS	"ENTER".	TYPE	CODE:	()				
	GEN CAT		SUBCAT-#			SUBCATEGORY	DESCRIPTION						
10	VALUES (COUNT)		026			ANY							
			027			USE	OF	SYSTEM	VOCABULARY				
			028			USE	OF	DATA	CONTROL	MANUAL			
	OUTPUT	DIRECTORS	029			LIST,	LISTV,	AND	LISTH				
			030			PRINT,	PRINTV,	AND	PRINTH				
			031			COUNT							
			032			COUNT	AND	COMPOUND	QUALIFIERS				
15			033			SAVE							
			034			INCOMPLETE	SAVE	STATEMENTS					
			035			COMPLETING	A	SAVE	STATEMENT				
			036			CHECK							
20	SPECIAL	PROG	IND'S	037		FIND							
			038			FIND	ALL						
			039			FIND	FILE	INDICATOR					
			040			FIND	FILE	INDICATOR,	CHARACTERISTICS				
			041			FIND	NNNNN						
25			042			DELETE							
	OUTPUT	SELECTOR	043			OUTPUTS	FOR	ATTRIBUTE	TYPES 1, 3, 5				
			044			TYPE 5	ATTRIBUTE =	GROUP					
			045			SAME							
			046			ALL							
30			047			REMARKS							
	GCD		048			FORMAT	OF	GCD	ATT	IN	QUALIFIER		
			049			RULES	FOR	GCD	ATT	IN	QUALIFIER		
			050			EXCLUDING	THE	SPECIFIED	LOCATION				
35	TO	SEE	THE	NEXT	PAGE,	PRESS	"NEXT	PAGE".					
	TO	STOP,	PRESS	"TERMINATE	TRAINING".								
37	24JAN1145Z							UNCLASSIFIED				02 OF 06	

Figure 3-5. Index for Free-Choice Review for Trainees Who Have Completed the Program (a cue) - Q4 (Sheet 2 of 6)

1	INDEX FOR FREE-CHOICE REVIEW:	UNCLASSIFIED	03 OF 06
5	CHOOSE THE SUBCATEGORY THAT YOU WISH TO REVIEW FIRST.		
5	TYPE SUBCATEGORY CODE AND PRESS "ENTER". TYPE CODE: ()		
	GEM CAT	SUBCAT-#	SUBCATEGORY DESCRIPTION
10	GCD (GCOMT)		
		051	LOCATION VALUES
		052	GCD ATT AND VALUE IN SAME MODIFIER
		053	FORMAT FOR GCD VALUES
		054	RULES FOR GCD VALUES
		055	FORMATS FOR GCD IN SELECTOR
		056	RULES FOR GCD IN SELECTOR
		057	FORMATS FOR SUM ATTRIBUTE IN QUAL
15	SUM	058	RULES FOR SUM ATT IN QUAL
		059	RELATIONS OF SUM ATT IN QUAL
		060	SUM-CONTROL ATTRIBUTES
		061	SUMMED ATTRIBUTES
20		062	PREPOSITION
		063	SUM WITH MIN/MAX VALUES
		064	SUM AND COMPOUND QUALIFIERS
		065	FORMATS FOR SUM IN SELECTOR
		066	RULES FOR SUM IN SELECTOR
25		067	SEL SUM WITH SUM-CON AND SUMMED ATTS
		068	SEL SUM WITH SUMMED ATTS ONLY
		069	SEL SUM WITH NO ATTRIBUTES
		070	SUM AND TOTAL
30	MIN OR MAX	071	FUNCTION OF MIN/MAX ATT IN QUAL
		072	FORMAT FOR MIN/MAX ATT IN QUAL
		073	RULES FOR MIN/MAX ATT IN QUAL
		074	RELATIONS OF MIN/MAX ATT IN QUAL
		075	USES OF MIN/MAX ATT IN QUAL
35	TO SEE THE NEXT PAGE, PRESS "NEXT PAGE",		
	TO STOP, PRESS "TERMINATE TRAINING".		
37	24 JAN 14 5Z	UNCLASSIFIED	03 OF 06

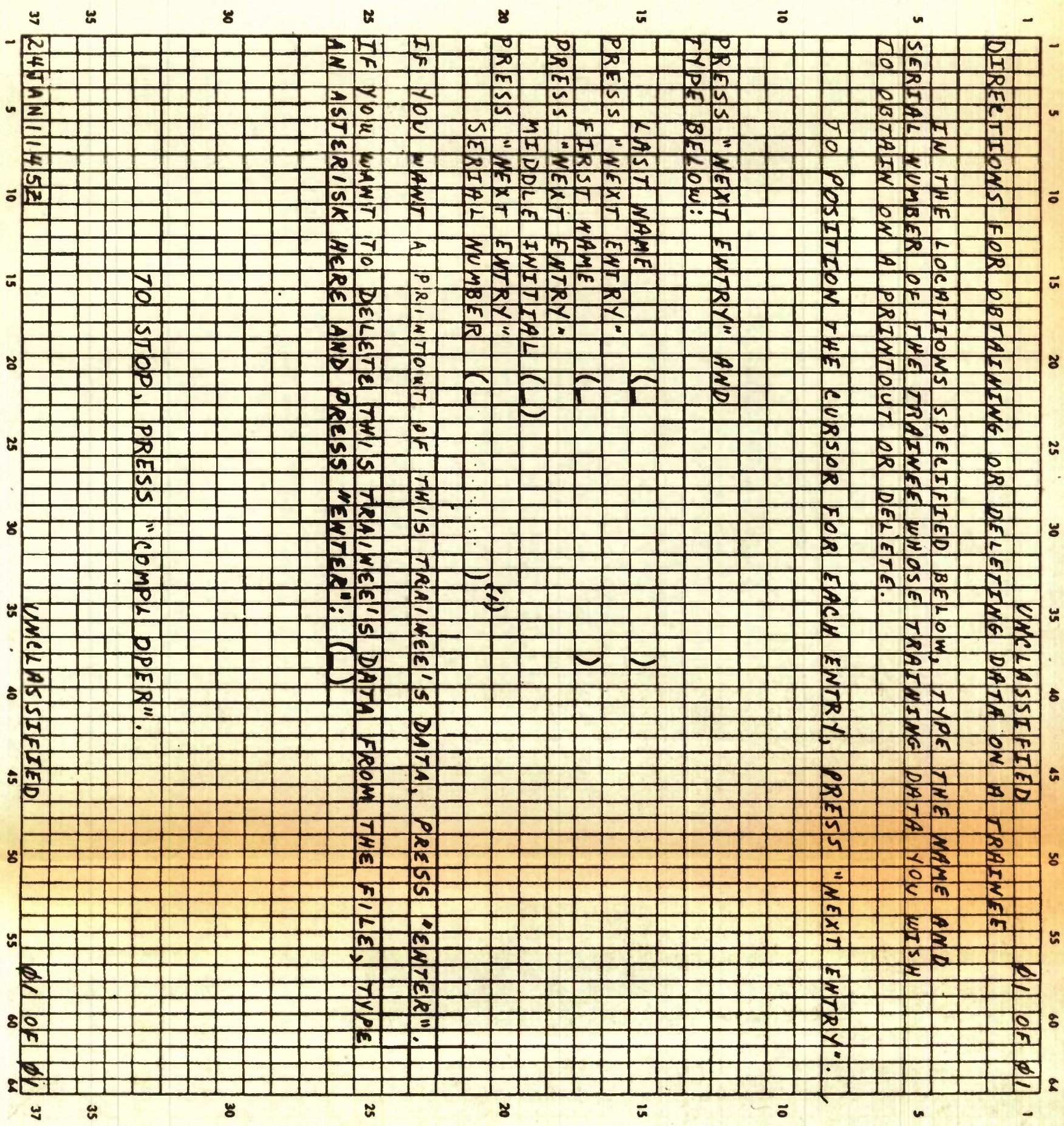
Figure 3-5. Index for Free-Choice Review for Trainees Who Have Completed the Program (a cue) - Q4 (Sheet 3 of 6)

1	INDEX FOR FREE-CHOICE REVIEW:	UNCLASSIFIED	04 OF 06
5	CHOOSE THE SUBCATEGORY THAT YOU WISH TO REVIEW FIRST. TYPE SUBCATEGORY CODE AND PRESS "ENTER". TYPE CODE: ()		
10	GEM CAT	SUBCAT-#	SUBCATEGORY DESCRIPTION
15	MIN OR MAX (COUNT)	076	MIN/MAX ATT WITH GCD ATT
20		077	TITLES FOR MIN/MAX ATTS IN QUAL
25		078	CONSTANT FOR A MIN/MAX ATT
30		079	FUNCTION OF MIN/MAX VALUES
35		080	FORMAT FOR MIN/MAX VALUES
40		081	RULES FOR MIN/MAX VALUES
45		082	RELATIONS OF MIN/MAX VALUES
50		083	MIN/MAX VALUE WITH MIN/MAX ATT
55		084	MIN/MAX VALUE WITH GCD ATT
60		085	MIN/MAX VALUES IN COMP QUAL
65		086	FORMATS FOR MIN/MAX IN SELECTOR
70		087	RULES FOR MIN/MAX IN SELECTOR
75		088	OUTPUTTING MIN/MAX IF TITLE IN QUAL
80		089	MIN/MAX TITLE IN SELECTOR
85	GREATEST OR LEAST	090	FUNCTION OF GREATEST/LEAST
90		091	FORMAT FOR GREATEST/LEAST
95		092	RULES FOR GREATEST/LEAST
100		093	RELATIONS OF GREATEST/LEAST
105		094	FORMATS FOR SORTS
110	SORTING	095	RULES FOR SORTS
115		096	RELATIONS OF SORTS
120		097	SORTS AND GCD
125		098	SORTS AND SUM
130		099	SORTS AND MIN/MAX
135		100	SORTS AND MIN/MAX TITLE
140	TO SEE THE NEXT PAGE, PRESS "NEXT PAGE".		
145	TO STOP, PRESS "TERMINATE TRAINING".		
150	24 JAN 11 4 52 E	UNCLASSIFIED	04 OF 06

Figure 3-5. Index for Free-Choice Review for Trainees Who Have Completed the Program (a cue) - 04 (Sheet 4 of 6)

1	INDEX FOR FREE-CHOICE REVIEW:	UNCLASSIFIED	66 OF 66
5	CHOOSE THE SUBCATEGORY THAT YOU WISH TO REVIEW FIRST.		
5	TYPE SUBCATEGORY CODE AND PRESS "ENTER". TYPE CODE: ()		
	GEM CAT	SUBCAT-#	SUBCATEGORY DESCRIPTION
10	GEM RULES (CONT)	126	FUNCTIONS OF OUTPUT DIRECTORS
		127	FUNCTION OF OUTPUT SELECTOR
		128	FUNCTION OF GCD ATT IN QUALIFIER
		129	FUNCTION OF GCD VALUES
		130	FUNCTION OF GCD IN SELECTOR
		131	FUNCTION OF SUM ATT IN QUALIFIER
15		132	FUNCTION OF SUM IN SELECTOR
		133	FUNCTION OF MIN/MAX IN SELECTOR
		134	FUNCTION OF SORTS
		135	FUNCTION OF COMPLEX QL
20			
25			
30			
35	TO SEE THE LAST PAGE, PRESS "PREVIOUS PAGE".		
35	TO STOP, PRESS "TERMINATE TRAINING".		
37	24 JAN 11 45Z	UNCLASSIFIED	66 OF 66

Figure 3-5. Index for Free-Choice Review for Trainees Who Have Completed the Program (a cue) - Q4 (Sheet 6 of 6)



PURPOSE: to guide an instructor in specifying the proper input to 1) obtain data on an individual trainee or 2) to delete a trainee from the file.

FOOTNOTES:

- 1) If an error is made in typing the serial number, or if no record of the serial number is found, the cue will be returned with an error message

Figure 3-6. Directions for Obtaining or Deleting Data on an Individual Trainee (a cue) - 45

1	INSTRUCTIONS FOR STARTING OR CONTINUING TRAINING	UNCLASSIFIED	01 OF 01
5	IN THE LOCATIONS SPECIFIED BELOW, TYPE YOUR NAME AND SERIAL NUMBER AND THEN PRESS "ENTER".		
10	TO POSITION THE CURSOR FOR EACH ENTRY, PRESS "NEXT ENTRY".		
15	PRESS "NEXT ENTRY" AND TYPE BELOW:		
20	LAST NAME ()		
25	PRESS "NEXT ENTRY" ()		
30	FIRST NAME ()		
35	PRESS "NEXT ENTRY" ()		
40	MIDDLE INITIAL ()		
45	PRESS "NEXT ENTRY" ()		
50	SERIAL NUMBER ()		
55	TO GET INSTRUCTIONS FOR THE TRAINING MATERIALS, PRESS "ENTER".		
60	TO STOP, PRESS "COMPL OPER".		
64	UNCLASSIFIED		01 OF 01

PURPOSE: to guide the trainee in entering his name and serial number, which are used to identify his training data.

FOOTNOTES:

- 1) If an error is made in typing, the cue will be returned with an error message.

Figure 3-7. Name and Serial Number Entry (a cue) - 06

PURPOSE: to preview the types of training materials the trainee will get now and start the trainee on these materials.

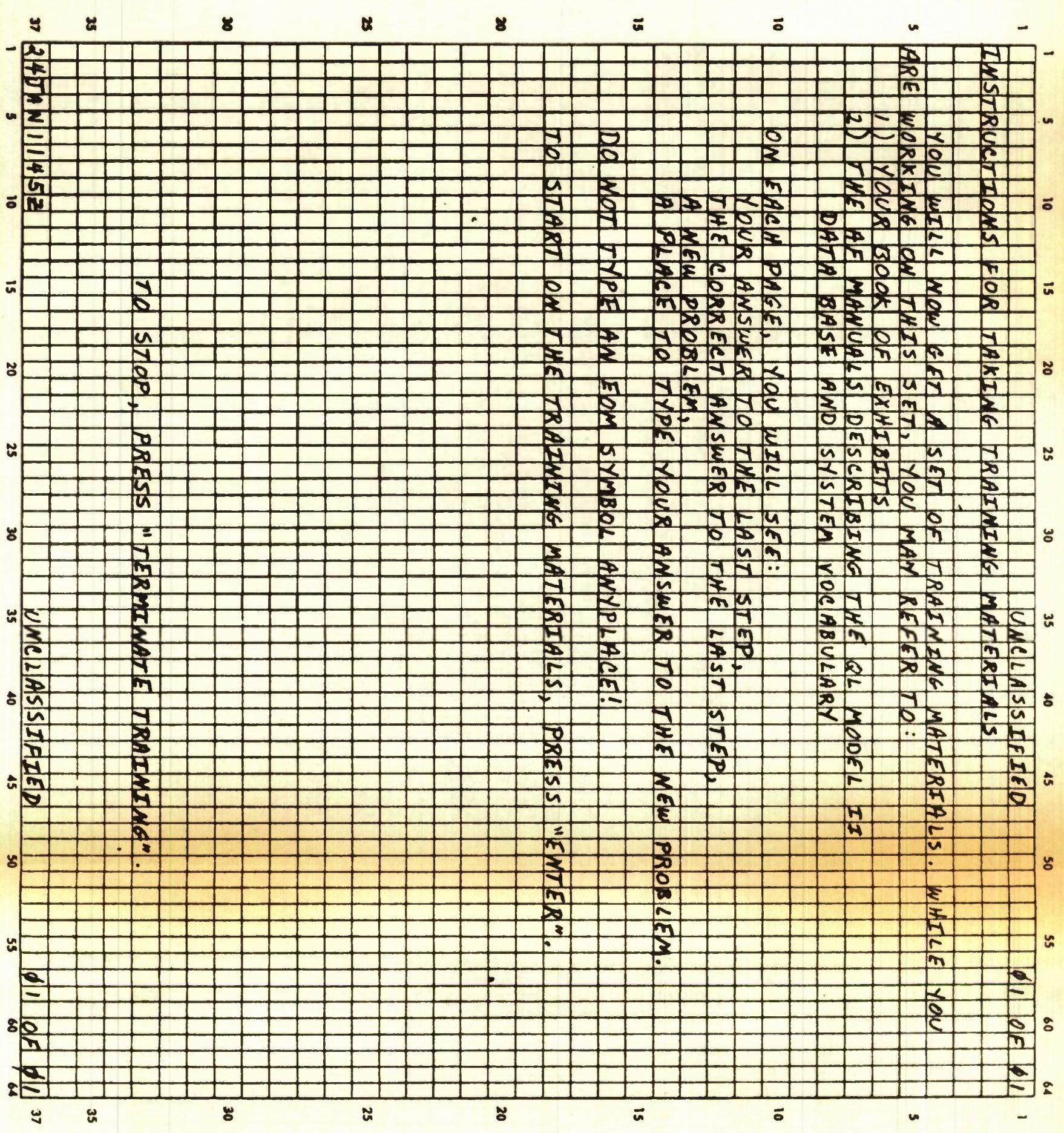
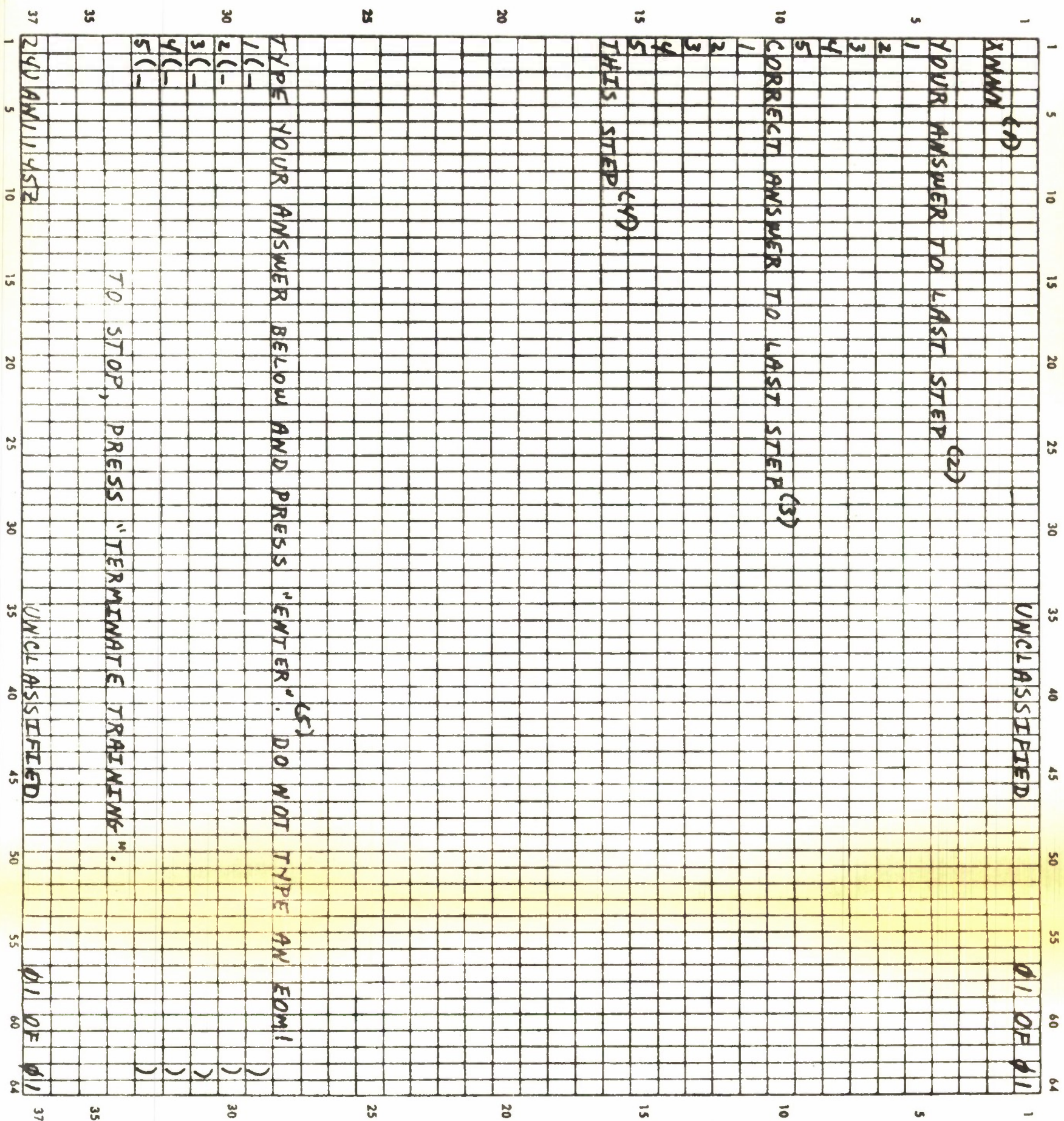


Figure 3-8. Instructions for Taking Training Materials (a cue) - Q7



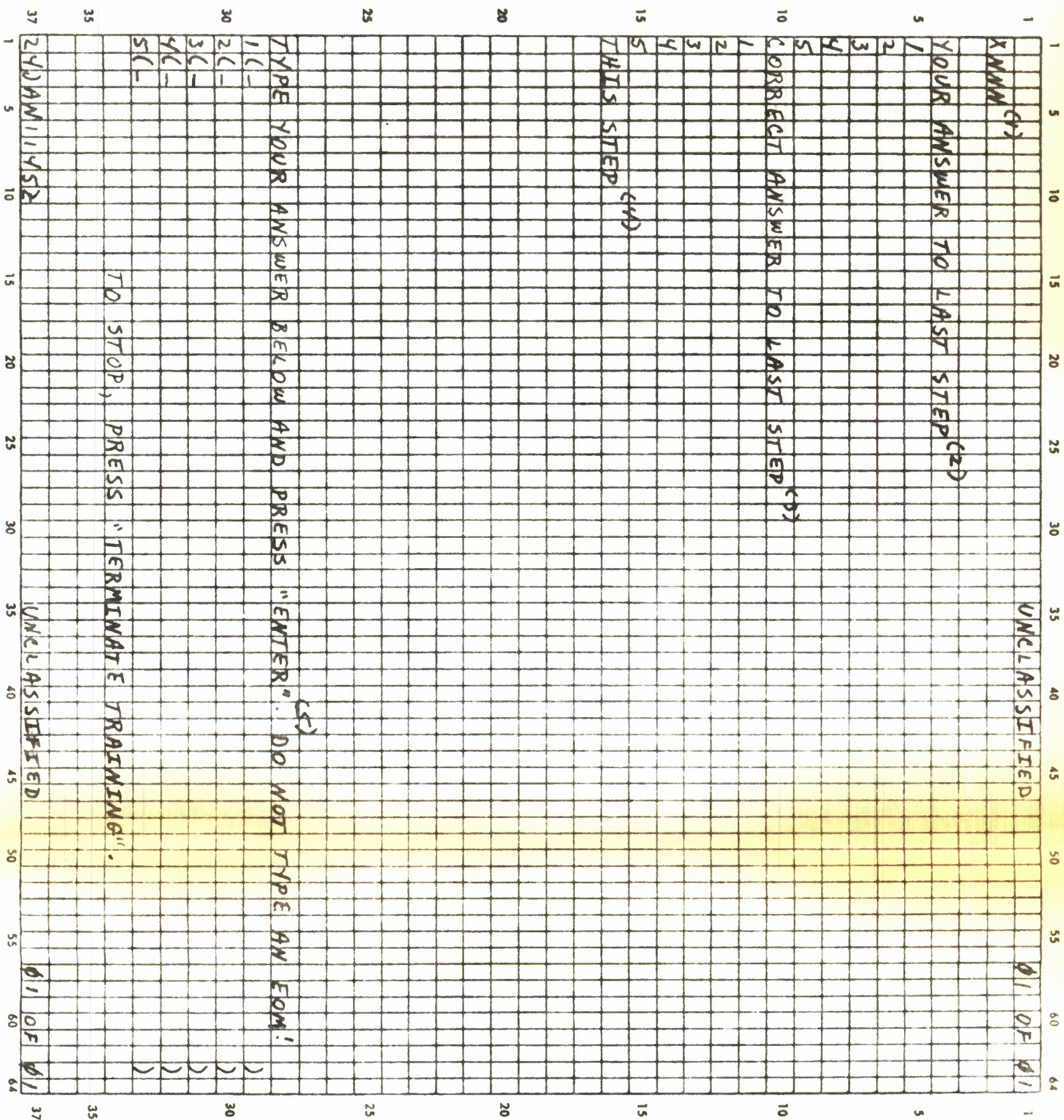
PURPOSE:

to present 1) the trainee's answer to the last step, 2) the correct answer to the last step, 3) the new step, and 4) a place for the trainee to type his answer to this new step.

FOOTNOTES:

- 1) XNNN represents the alphanumeric code for a set and step number. The first character is alphabetic and represents the set; the next three characters are numeric and represent the step number. All cues within a set are numbered sequentially, regardless of type.
- 2) The information on lines 5-9 will give the answer that the trainee typed on the preceding step (in lines 29-33).
- 3) The information on lines 11-15 will give the correct answer to the last step; this will be canned (not generated by the computer). Each Q8 will have multiple-choice or one-word answers.
- 4) The new step will be given on lines 17-27.
- 5) Although each problem may not require all of the blanks provided for answers, the format allows for the maximum number used by any problem. "ENTER" will present the next cue in the set.

Figure 3-9. Linear Training Problem - PX (a cue) - Q8



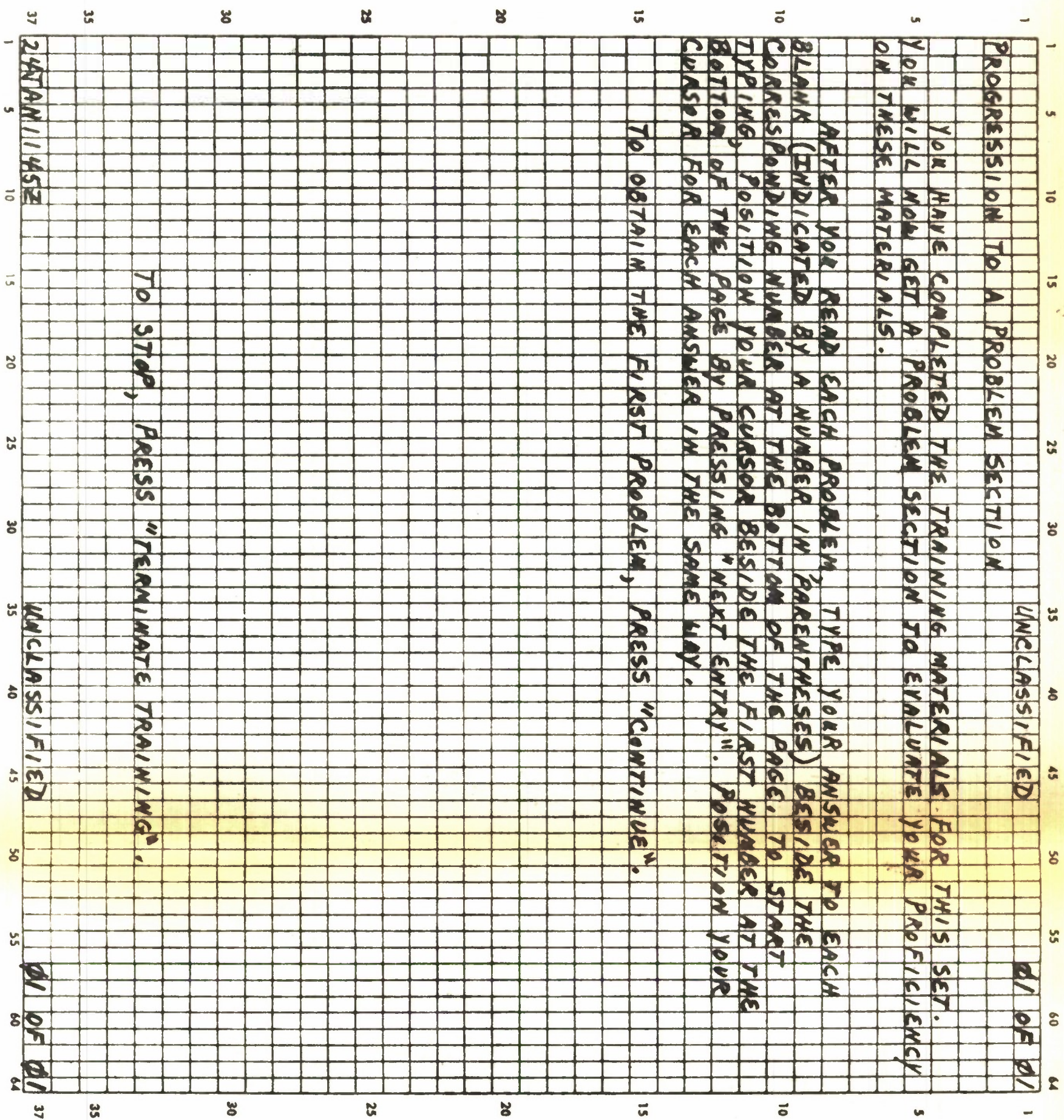
PURPOSE:

to present 1) the trainee's answer to the last step, 2) the correct answer to the last step, 3) the new step, and 4) a place for the trainee to type his answer to this new step.

FOOTNOTES:

- 1) XNNN represents the alphanumeric code for a set and step number. The first character is alphabetic and represents the set; the next three characters are numeric and represent the step number. All cues within a set are numbered sequentially, regardless of type.
- 2) The information on lines 5-9 will give the answer that the trainee typed on the preceding step (in lines 29-33).
- 3) The information on lines 11-15 will give the correct answer to the last step; this will be canned (not generated by the computer). Those 00's that are to be used as remedial practice problems will have multiple-choice or one-word answers.
- 4) The new step will be given on lines 17-27.
- 5) Although each problem may not require all of the blanks provided for answers, the format allows for the maximum number used by any problem. "ENTER" will present the next cue in the set.

Figure 3-10. Linear Training Step - LX/LY (a cue) - 00



PURPOSE: to advise the trainee that he will now get a set of problems to evaluate his proficiency on the preceding training materials, and to indicate the correct procedure for working on these problems.

Figure 3-12. Progression to a Px Problem Section (a cue) - 910

1	1	5	10	15	20	25	30	35	40	45	50	55	60	64
1	XNNN	(1)												
5	STATEMENT OF PROBLEM: (2)													
10														
15	PRESS "NEXT ENTRY" AND TYPE ANSWER FREE-FORM, BUT OMIT EOM: (3)													
20														
25	POSITION WITH "NEXT ENTRY": TYPE ANSWERS; THEN PRESS "ENTER" (4)													
30	1	()
35	2	()
40	3	()
45	4	()
50	TO STOP, PRESS "TERMINATE TRAINING".													
55	UNCLASSIFIED													
60	0	1												
64	0	1												

PURPOSE: to present a problem and a place for the trainee to type his answer, for those problems that will undergo computer analysis.

FOOTNOTES:

- 1) XNNN represents the alphanumeric code for a set and step number. The first character is alphabetic and represents the set; the next three characters are numeric and represent the step number. All cues within a set are numbered sequentially, regardless of type.
 - 2) Lines 5-16 will state the new problem.
 - 3) The trainee's free-form answer will be typed on lines 18-24.
 - 4) The trainee's answers for error analysis will be typed on lines 26-33. These answers will be matched against those provided for programmer use for the same set-and-problem code. Subcategories to be associated with the answers will also be specified for programmer use. Errors are tallied within a problem set on each of the subcategories specified for that problem set.
- Although each problem may not require all of the blanks provided for answers, the format allows for the maximum number used by any problem.

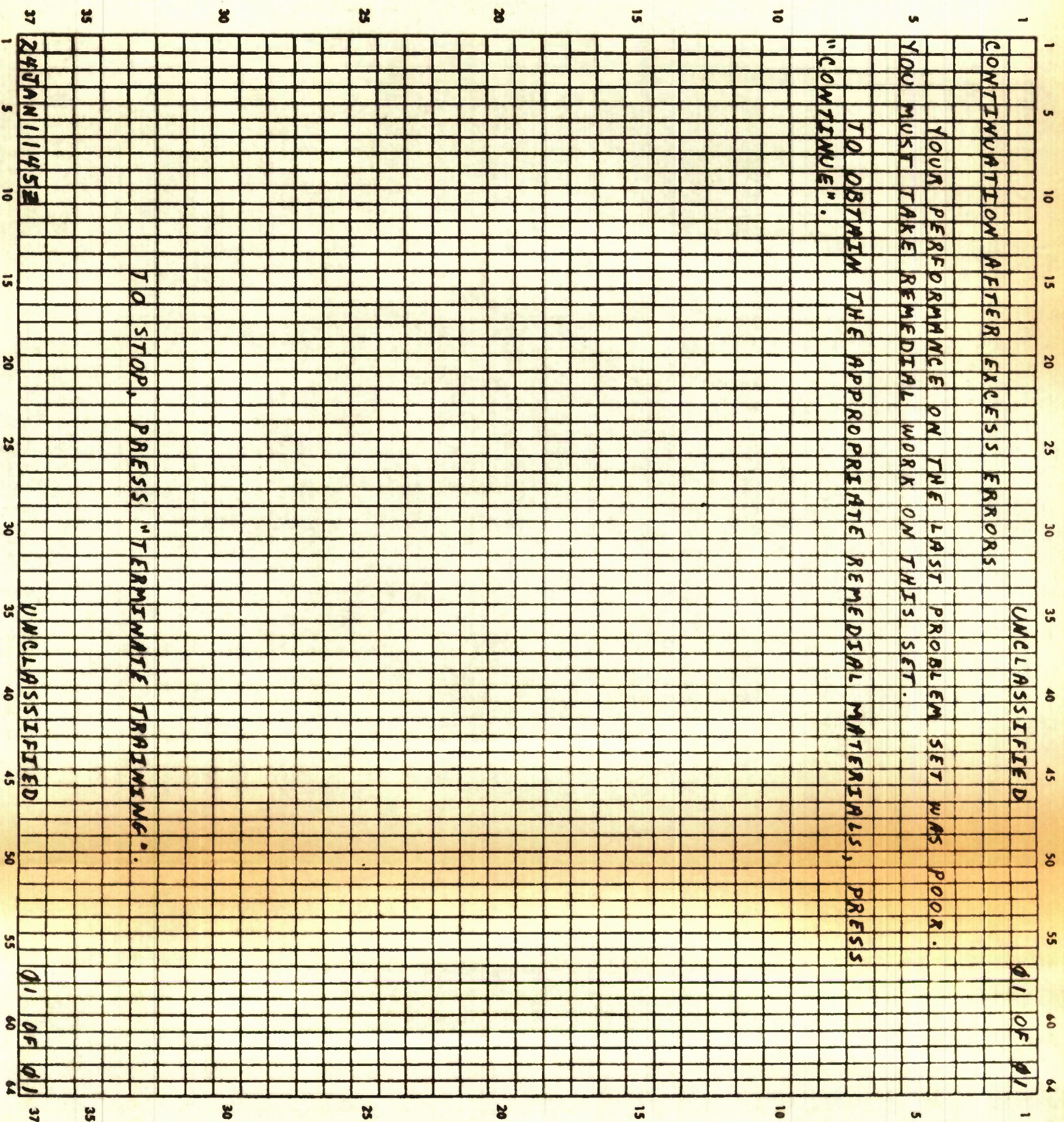
Figure 3-13. A Problem to be Analyzed - A PY (a cue)
- Q11

1	1	5	10	15	20	25	30	35	40	45	50	55	60	64
1	4	5	6										01	01
2	0	5	6											
3														
4														
5														
6														
7														
8														
9														
10														
11														
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63														
64														

FOOTNOTES:

- 1) This is a representative example of a QIL. All of the problems that will be used have not been defined at this time, but they will all follow this format.
- 2) The trainee must not type an EOM symbol on a cue.

Figure 3-14. Example of a QIL, Including the Material Typed by the Trainee



PURPOSE: to advise the trainee that he must take remedial work on the materials covered by the last problem set and to start him on these materials.

Figure 3-15. Continuation After Excess Errors on a Px Section (a cue) - Q12

PURPOSE: to advise the trainee that his performance on the last problem set was good and start him on the next training set.

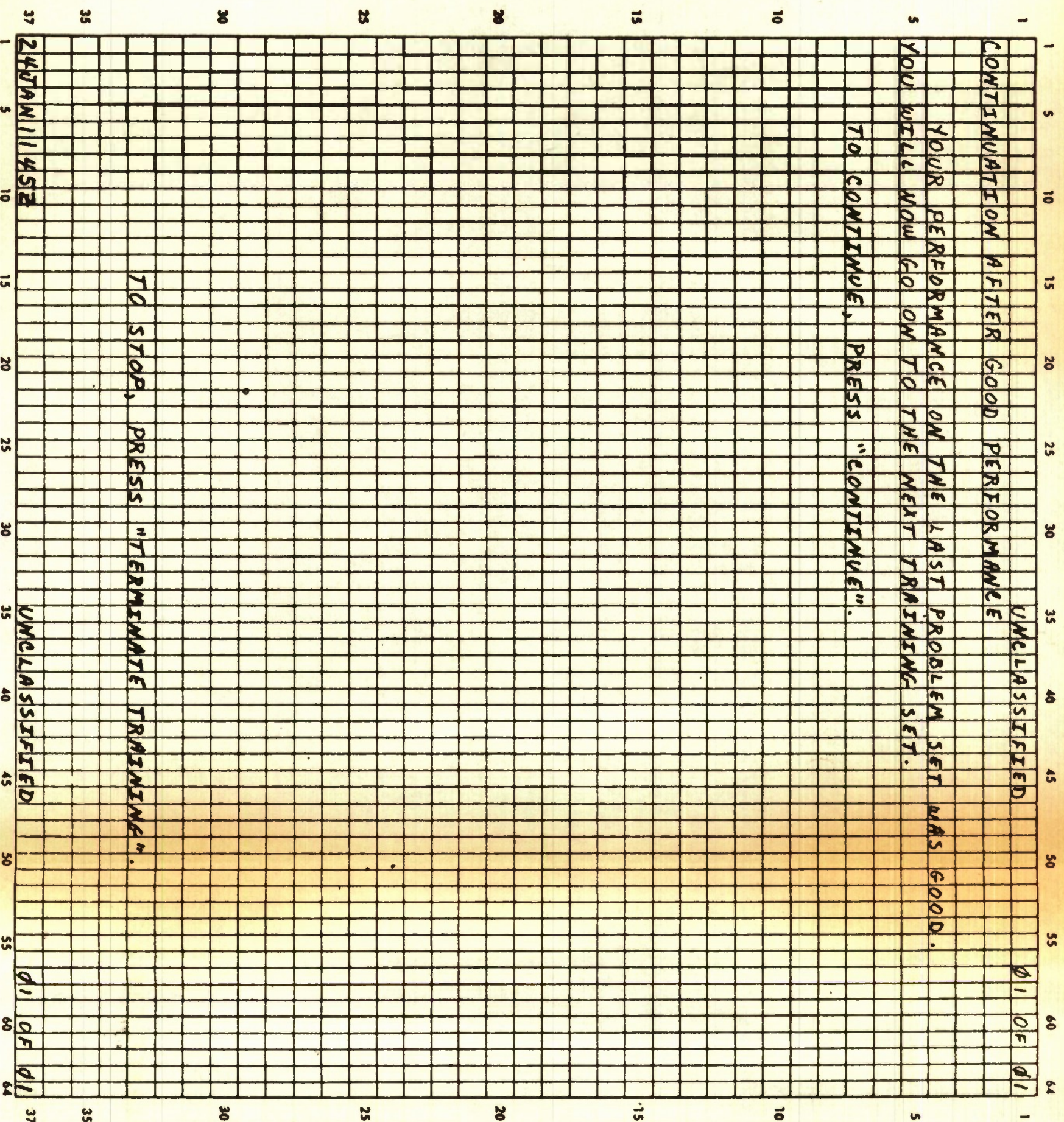


Figure 3-16. Continuation
After Good Performance on
a Px Section (a cue) - Q13

1	5	10	15	20	25	30	35	40	45	50	55	60	64
1	UNCLASSIFIED												01 OF 01
1	PROGRESSION TO A PROBLEM SET.												
5	YOU HAVE COMPLETED A SET OF TRAINING MATERIALS. YOU WILL NOW GET A SET OF PROBLEMS TO EVALUATE YOUR PROFICIENCY ON THESE MATERIALS.												
10	AFTER YOU READ EACH PROBLEM, TYPE THE APPROPRIATE QUERY LANGUAGE STATEMENT IN THE SPACE PROVIDED BELOW THE PROBLEM. THEN TYPE THOSE PARTS OF THE STATEMENT THAT THE PROBLEM REQUESTS AT THE BOTTOM OF THE PAGE. THEN PRESS "ENTER".												
15	TO OBTAIN THE FIRST PROBLEM, PRESS "CONTINUE".												
20													
25													
30													
35													
37	24 JAN 11 4 52												
1	5	10	15	20	25	30	35	40	45	50	55	60	64
1	UNCLASSIFIED												01 OF 01
1	TO STOP, PRESS "TERMINATE TRAINING".												
5													
10													
15													
20													
25													
30													
35													
37	UNCLASSIFIED												

PURPOSE: to advise the trainee that he has finished a set of training materials and start him on the set of problems designed to evaluate his proficiency on the preceding training materials.

Figure 3-17. Progression to a Py Problem Section (a cue) - Q14

UNCLASSIFIED

01 OF 01

CONTINUATION AFTER CORRECT ANSWER TO A PROBLEM

YOUR ANSWER TO THE LAST PROBLEM WAS CORRECT.

TO CONTINUE, PRESS "CONTINUE". (1)

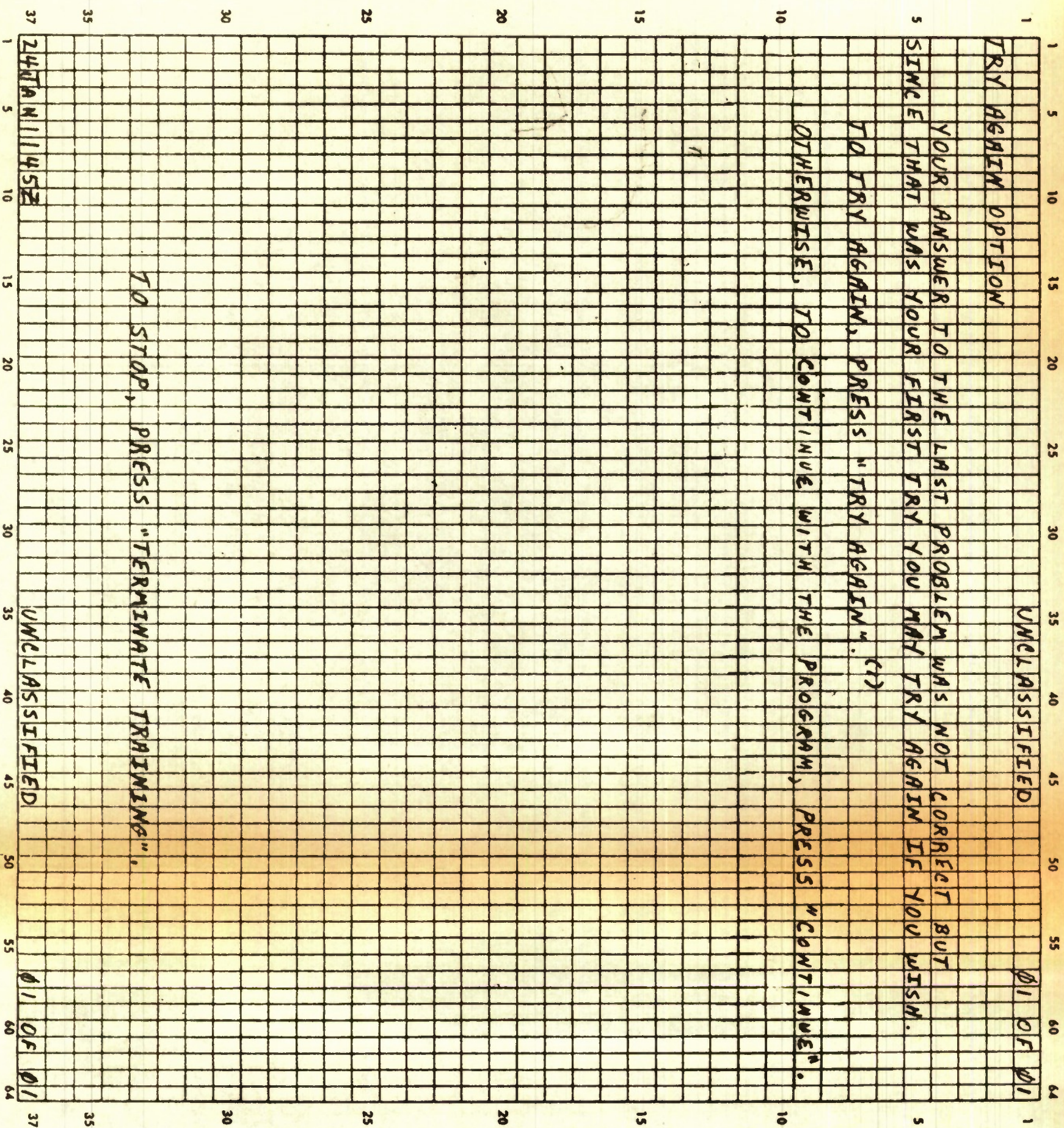
TO STOP, PRESS "TERMINATE TRAINING".

UNCLASSIFIED

01 OF 01

FOOTNOTES:

Figure 3-18. Continuation
After Correct Answer to a
Py Problem (a cue) - Q15

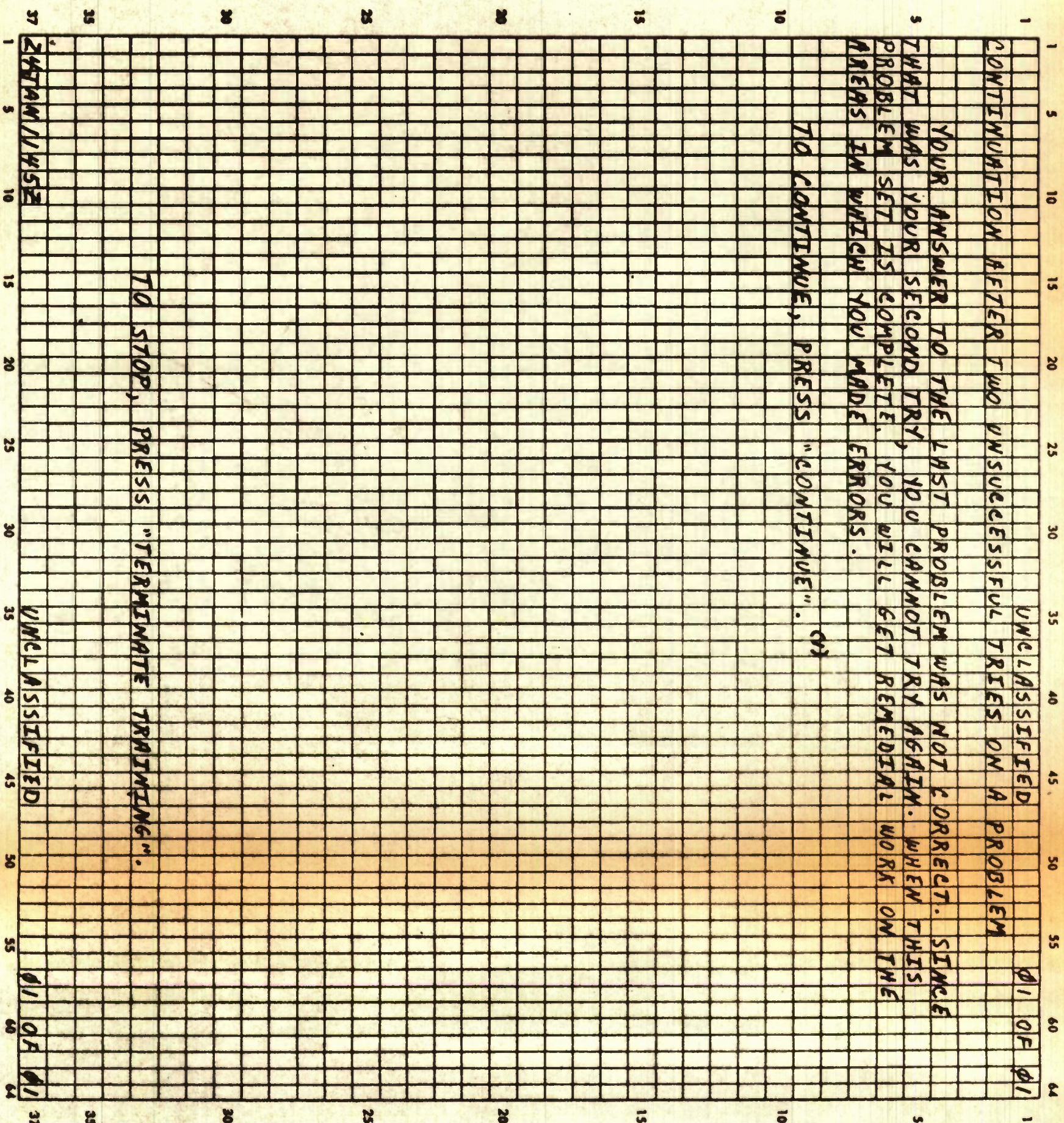


PURPOSE: to advise the trainee that his answer to the last problem (a Py) was not correct and he may try again, if he wishes; otherwise, he should go on to the next problem (or, have his performance evaluated if he has finished the set).

FOOTNOTES:

- 1) "TRY AGAIN" will present the last problem again (a Q11).

Figure 3-19. Try Again Option (a cue) - Q16



PURPOSE:

to advise the trainee that he has missed the last problem twice and cannot try again, and start him on the next problem (or, initiate his evaluation if he has finished the problem set).

FOOTNOTES:

- 1) "CONTINUE" will either present the next problem (a Q11) or, if all problems in this set are complete, it will initiate an analysis of the trainee's performance on subcategories (for both Group A and Group B trainees -- the remedial sequences are not forced on Group B trainees, but their performance does undergo evaluation and their rating on each subcategory for the last Py set will appear on Q21, just as for Group A trainees).

Figure 3-20. Continuation After Two Unsuccessful Tries on a Py Problem (a cue) - Q17

1 INTRODUCTION TO PRACTICE EXERCISES UNCLASSIFIED 01 OF 01

5 THE NEXT SET OF PROBLEMS IS DESIGNED TO INCREASE YOUR PROFICIENCY IN WRITING COMPLETE Q1 STATEMENTS. FOR EACH PROBLEM YOU WILL TYPE WHAT YOU THINK IS THE APPROPRIATE Q1 STATEMENT AND THEN CHECK YOUR ANSWER AGAINST THE CORRECT ANSWER GIVEN ON THE NEXT PAGE.

10 TO OBTAIN THE FIRST PROBLEM, PRESS "CONTINUE". (1)

15

20

25

30

35

37 24 JAN 11 14 52Z UNCLASSIFIED 01 OF 01

TO STOP, PRESS "TERMINATE TRAINING".

PURPOSE: to describe the procedure for working on the practice exercises and start the trainee on the first exercise in the appropriate set.

FOOTNOTES:

- 1) "CONTINUE" will present the first practice exercise in the appropriate set, a Q19.

Figure 3-21. Introduction to Free-Form Practice Exercises (a cue) - Q18

1	5	10	15	20	25	30	35	40	45	50	55	60	64
1	UNCLASSIFIED											Q1 OF Q1	
2	XNNN (2)												
3	STATEMENT OF PROBLEM: (3)												
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20	PRESS "NEXT ENTRY" AND TYPE THE PROPER QUERY, BUT OMIT EOM: (4)												
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													
31													
32													
33													
34													
35													
36													
37	UNCLASSIFIED												
38	Q1 OF Q1												

PURPOSE:

to give practice in writing complete QL statements that are appropriate to specific problems. Each Q19 will be followed by a Q19A to provide feedback regarding the correct answer. These exercises constitute a critical aspect of the training because the other problems that require the writing of QL statements (the Q9's and Q11's) do not provide any feedback to the trainee on the correct QL statement as a whole, and error analysis and subsequent forced remedial work are based on only those isolated parts of the QL statement that are requested for analysis.

FOOTNOTES:

- 1) These exercises require no error-analysis by the computer.
- 2) XNNN represents the alphanumeric code for a set and step number. The first character is alphabetic and represents the set; the next three characters are numeric and represent the step number. All cues within a set are numbered sequentially, regardless of type.
- 3) The statement of the problem will be on lines 5-19.
- 4) The trainee's answer will be typed on lines 21-32.

Figure 3-22. Free-Form Practice Exercise (a cue) - Q19

1	5	10	15	20	25	30	35	40	45	50	55	60	64
1	XNNN (2)												Q1 OF Q1
5													
10													
15													
20													
25													
30													
35													
40													
45													
50													
55													
60													
64													
1	5	10	15	20	25	30	35	40	45	50	55	60	64
1	2400AN1145E												Q1 OF Q1
5													
10													
15													
20													
25													
30													
35													
40													
45													
50													
55													
60													
64													
1	5	10	15	20	25	30	35	40	45	50	55	60	64
1	2400AN1145E												Q1 OF Q1
5													
10													
15													
20													
25													
30													
35													
40													
45													
50													
55													
60													
64													

PURPOSE: to provide feedback on each Q19 problem, so that the trainee can check his answer.

FOOTNOTES:

- 1) This is the answer cue for the previous Q19. These exercises require no error-analysis by the computer.
- 2) XNNN represents the alphanumeric code for a set and step number. The first character is alphabetic and represents the set; the next three characters are numeric and represent the step number. All cues within a set are numbered sequentially, regardless of type.
- 3) The trainee's answer to this problem is on lines 5-19.
- 4) The correct answer to this problem is on lines 21-32.
- 5) "CONTINUE" will present the next practice exercise, a Q19, in the set being worked on.

Figure 3-23. Free-Form Practice Exercise Answer (a cue) - Q19A

8096

UNCLASSIFIED

01 OF 01

STATEMENT OF PROBLEM:

TO DISPLAY THE STORAGE LOCATION AT EACH POB THAT HAS THE GREATEST SUPPLY OF LIQUID OXYGEN AND DISPLAY THE ACTUAL ASSETS OF THIS ITEM AT EACH OF THESE SELECTED STORAGE LOCATIONS, AND THE APPROPRIATE POB'S. LET THE COMPUTER DETERMINE THE CRT FORMAT.

PRESS "NEXT ENTRY" AND TYPE THE PROPER QUERY:

(RETRIEVE MATERIAL STATUS WITH ITEM=LQOX, SL ASSET=GREATEST THEN LIST POB, STORAGE LOC, SL ASSET CD)

TO CHECK YOUR ANSWER, PRESS "ENTER".

TO STOP, PRESS "TERMINATE TRAINING".

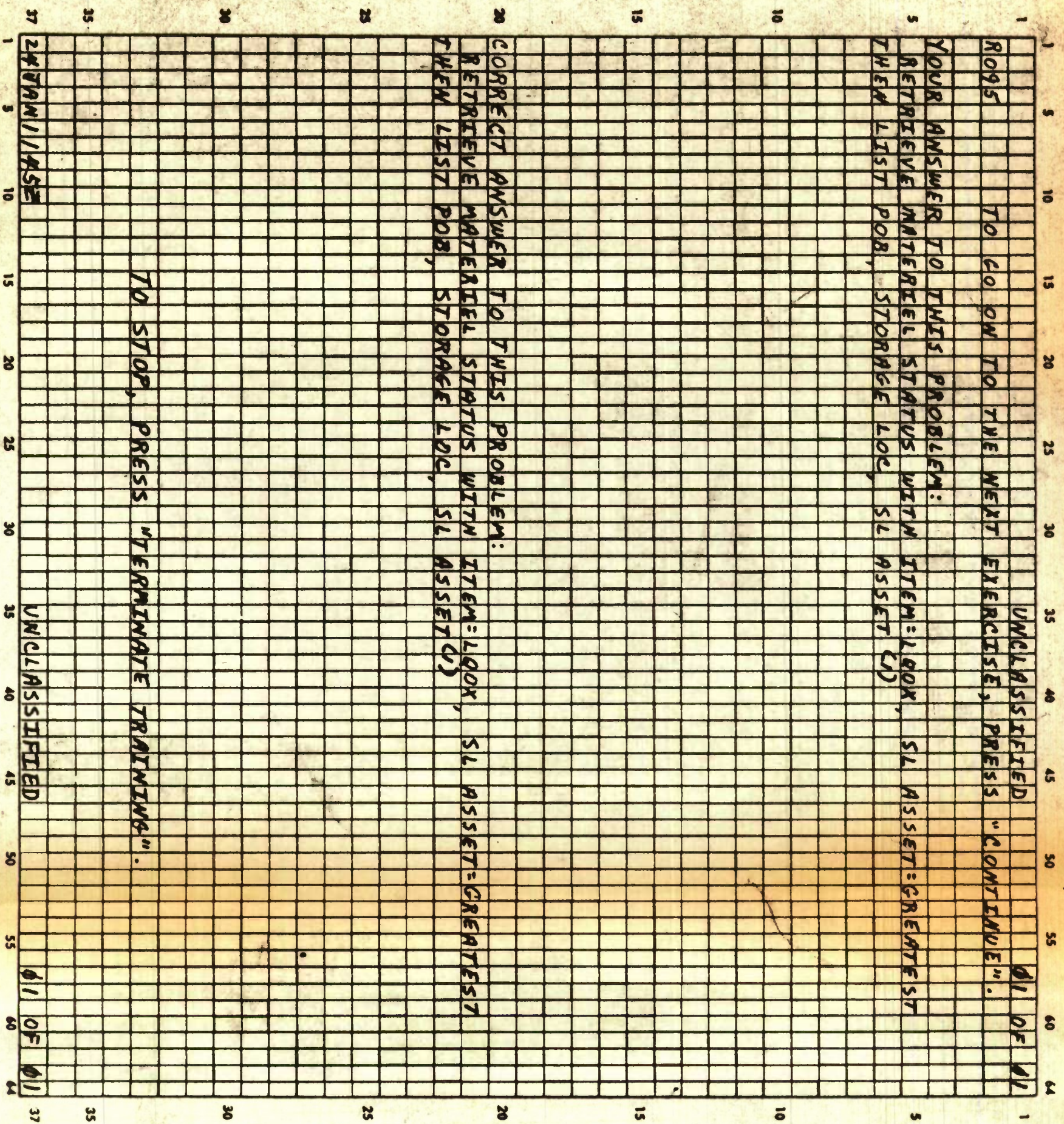
UNCLASSIFIED

01 OF 01

FOOTNOTES:

- 1) An EOM symbol (7) cannot be typed by the trainee on any cue -- if the trainee did this, the rest of the cue would be lost.

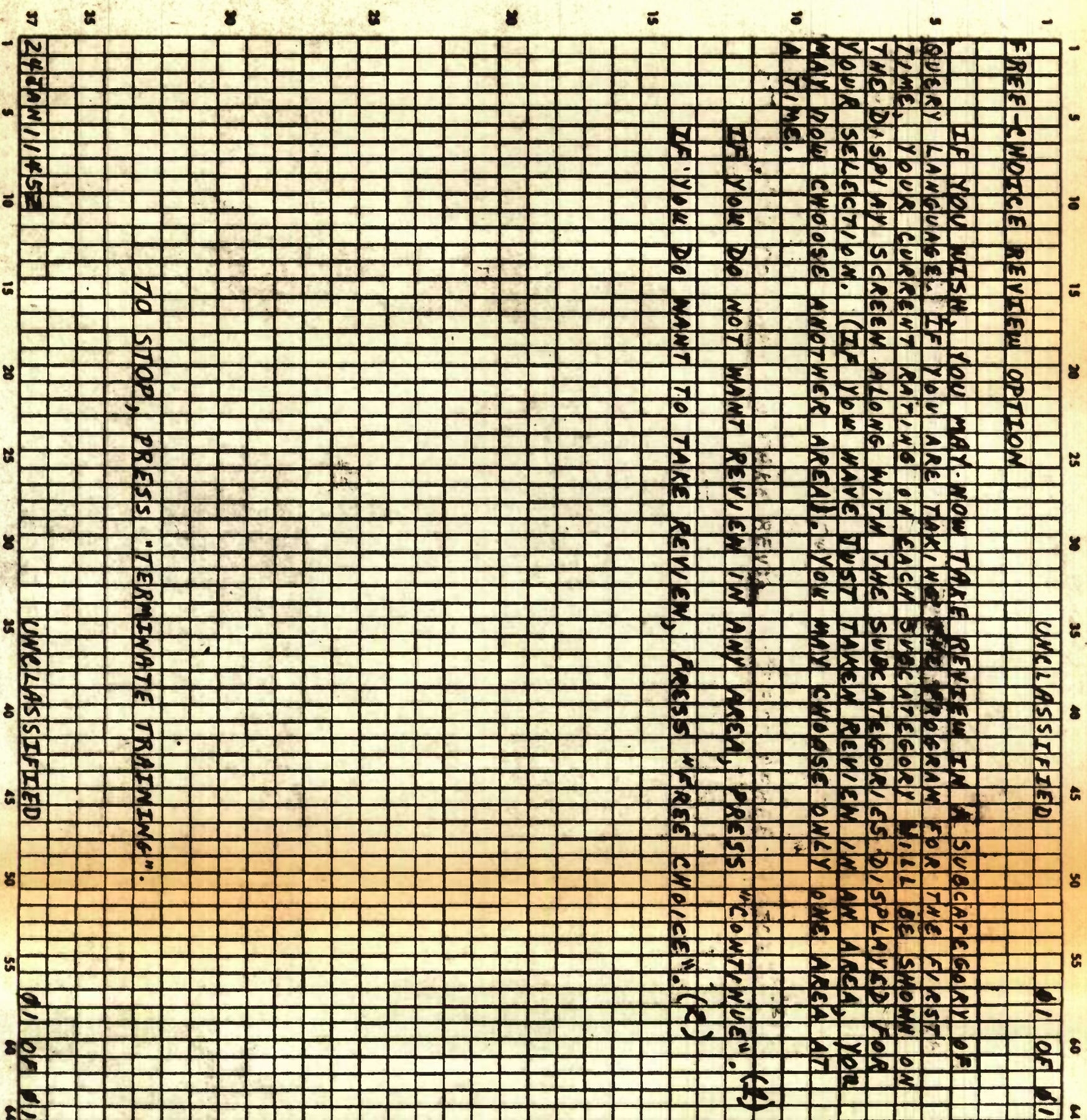
Figure 3-24. Example of a q19, Including the Material Typed by the Trainee



FOOTNOTES:

- 1) An EOM symbol (7) cannot be typed by the trainee on any cue -- if the trainee did this, the rest of the cue would be lost.

Figure 3-25. Example of a Q19A, Including the Trainee's Answer to the Preceding Q19



PURPOSE: to advise the trainee that, if he wishes, he may take materials to review any subcategories that were used by the last problem set, and either send him to an index with subcategories that he may choose from or send him on to the next appropriate point.

FOOTNOTES:

- 1) For new or old trainees, "CONTINUE" will either (1) present the first problem in the next problem set (a Q1); or (2) if all sets but the posttest have been completed, it will present the first problem in the posttest. For P-M trainees, "CONTINUE" will present Q2.
- 2) "FREE CHOICE" will present Q4.

Figure 3-26. Free-Choice Review Option (a cue) - Q20

1	INDEX FOR FREE-CHOICE REVIEW.	UNCLASSIFIED	Q1 OF 21
5	CHOOSE THE SUBCATEGORY THAT YOU WISH TO REVIEW FIRST.		
10	TYPE SUBCATEGORY CODE AND PRESS "ENTER". TYPE CODE: ()		
15	RATINGS ()	SUBCAT-# ()	SUBCATEGORY DESCRIPTION ()
20			
25			
30			
35			
40			
45			
50			
55			
60			
65			
70	IF THE LINE JUST ABOVE THIS IS BLANK, THERE IS NO PAGE 02.		
75	TO OBTAIN THE MATERIALS ON THE CHOSEN SUBCAT, PRESS "ENTER".		
80	IF NO SUBCAT IS DESIRED, PRESS "SKIP".		
85	TO SEE THE NEXT PAGE, PRESS "NEXT PAGE".		
90	TO STOP, PRESS "END/NO TRAINING".		
95	UNCLASSIFIED		Q1 OF 21

PURPOSE: To present a list of the subcategories that were analyzed by the last FY problem set and the trainee's performance rating on each of these subcategories. Also, it will give a content-description for each of the subcategories listed. This may be used by the trainee to select a subcategory for free-choice review, if he wishes to do so.

FORMAT:

- 1) This cue will have a maximum of two pages. The second page of Q21 will be used only when the preceding FY problem set was a CUMULATIVE set (i.e., for a maximum of 6 (six) CUMULATIVE sets (Q4 will be used after the POSTTEST instead of Q21).
- 2) If the trainee types on both pages, the number typed on page 2 will be ignored.

FOOTNOTES:

- 1) Trainee ratings for each subcategory listed will be the ratings from the last FY. They will start on line 9 on each page, and can occupy columns 1-9, at the maximum, starting in column 1. Possible ratings are values used to indicate EXCELLENT, GOOD, AVERAGE, and POOR.
- 2) Starting in line 9, the subcategory numbers for the subcategories analyzed on the last FY will be generated (along with the trainee's rating on each and the appropriate subcategory description -- see Q4 for a complete list of subcategory descriptions). The numbers will be right-justified with leading zeros to fill columns 20-22, starting in line 9 and going down as far as line 28 on each page, as required for the number to be generated. Thus, there will be a maximum of 20 subcategories generated for each CRT page. Following an INDEPENDENT FY it will be a one-page cue, because an INDEPENDENT FY has a maximum of 20 subcategories analyzed; following a CUMULATIVE FY, it may be a two-page cue, because a CUMULATIVE FY can have a maximum of 40 subcategories analyzed.

Figure 3-27. Index for Free-Choice Review for Trainees Who Have Not Completed the Program (a cue) - Q21 (sheet 1 of 2)

PURPOSE: to show what the second page of Q21 would look like.

1	INDEX FOR FREE-CHOICE REVIEW.	UNCLASSIFIED	Q2 OF Q2
5	CHOOSE THE SUBCATEGORY THAT YOU WISH TO REVIEW FIRST.		
10	TYPE SUBCATEGORY CODE AND PRESS "ENTER". TYPE CODE: ()		
15	RATING	SUBCAT-#	SUBCATEGORY DESCRIPTION
20		MM	
25			
30			
35			
40			
45			
50			
55			
60			
64			
1			
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30			
35			
40			
45			
50			
55			
60			
64			
1			
5			
10			
15			

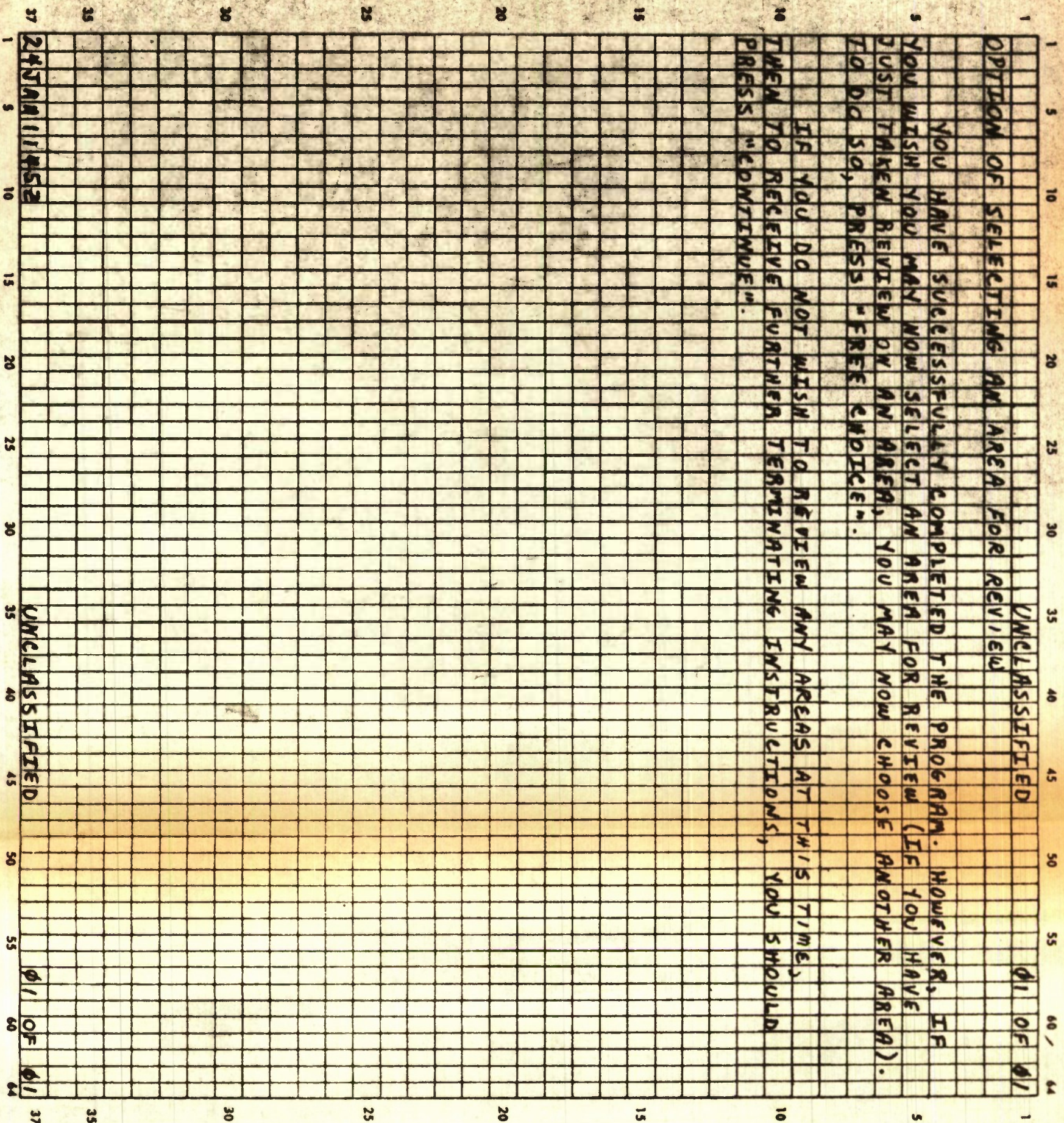
1	5	10	15	20	25	30	35	40	45	50	55	60	64	
INSTRUCTIONS FOR TAKING FREE-CHOICE REVIEW										UNCLASSIFIED				01 OF 01
5	YOU WILL NOW GET A SET OF MATERIALS ON THE AREA YOU SELECTED.													
10	ON EACH PAGE YOU WILL SEE YOUR ANSWER TO THE LAST STEP, THE CORRECT ANSWER, A NEW PROBLEM, AND A PLACE TO TYPE YOUR ANSWER TO THE NEW PROBLEM.													
15	WHILE YOU ARE WORKING ON THIS REVIEW SET, THE "SKIP" KEY WILL BE LIT. IF YOU FEEL YOU HAVE OBTAINED SUFFICIENT INFORMATION ON THIS AREA BEFORE YOU HAVE COMPLETED THE SET, YOU MAY SKIP THE REMAINING STEPS BY PRESSING "SKIP".													
20	WHEN YOU COMPLETE THE SET OR SKIP OUT, YOU WILL BE GIVEN A CHANCE TO SELECT MORE AREAS FOR REVIEW OR TO GO ON TO THE NEXT SET OF MATERIALS.													
25	TO OBTAIN THE FIRST REVIEW PROBLEM, PRESS "CONTINUE". (C)													
30														
35														
37	TO STOP, PRESS "TERMINATE TRAINING".													
1	5	10	15	20	25	30	35	40	45	50	55	60	64	
24 JAN 11 4 52										UNCLASSIFIED				01 OF 01

PURPOSE: to give instructions for taking the free-choice review materials.

FOOTNOTES:

- 1) "CONTINUE" will present the first review step in the sequence appropriate to the subcategory chosen (a q9).

Figure 3-28. Instructions for Taking Free-Choice Review (a cue) - Q22



PURPOSE: to give the trainee a chance to choose another subcategory for free-choice review.

Figure 3-29. Option of Selecting an Area for Review (a cue) - Q23

PURPOSE: to advise the trainee that his performance was poor on a subcategory for which he will now get a remedial sequence, and start him on this sequence.

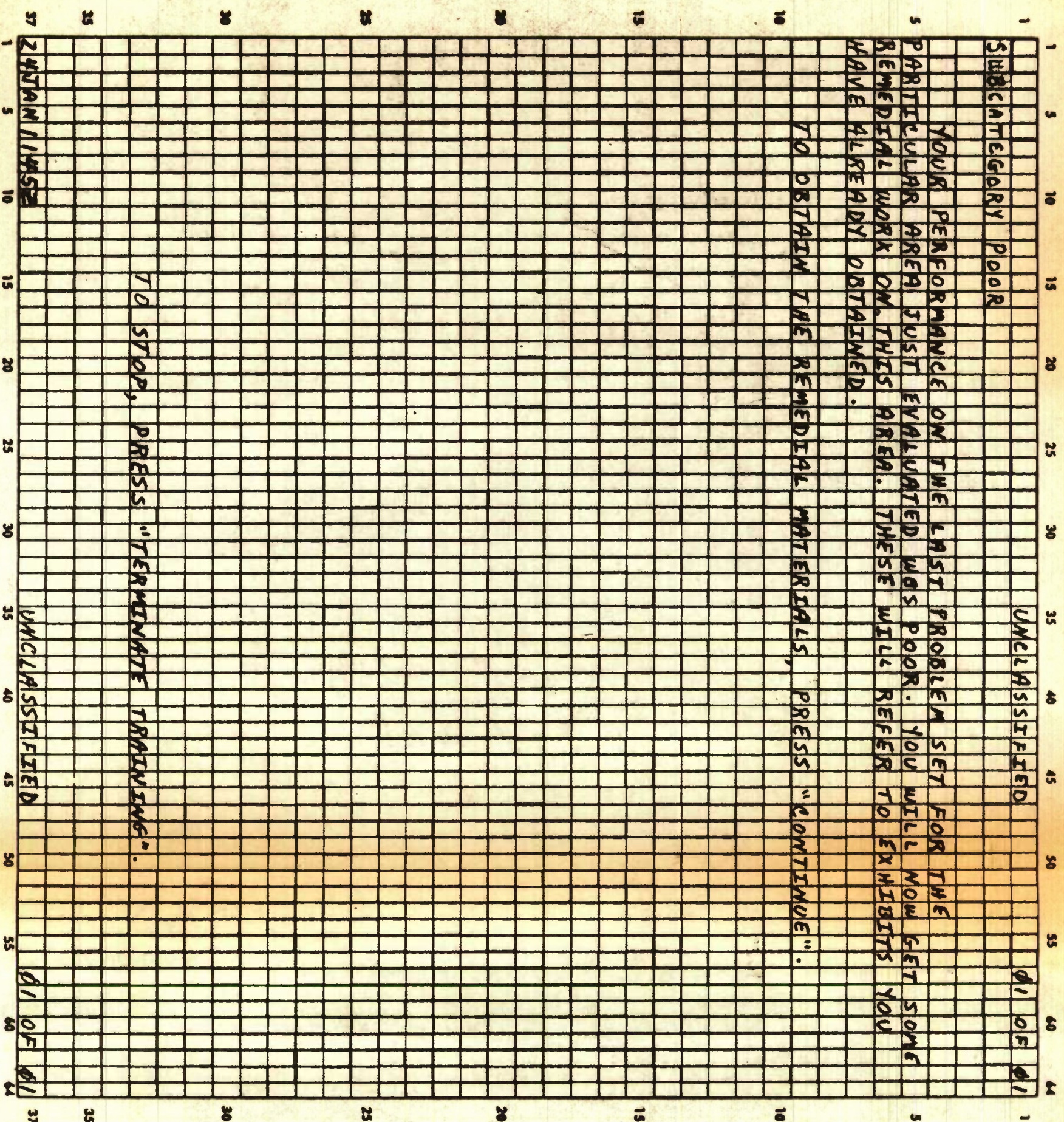
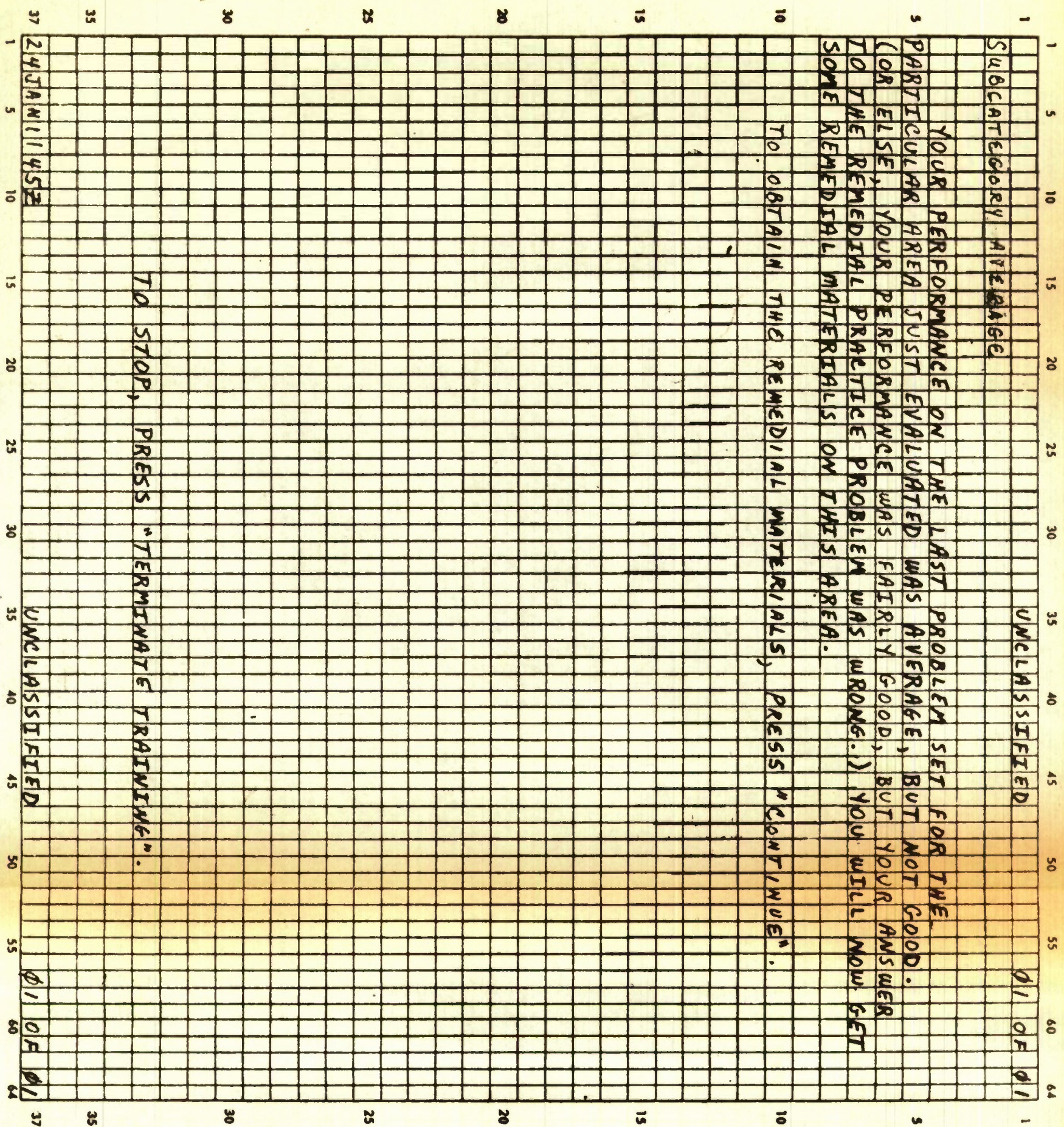
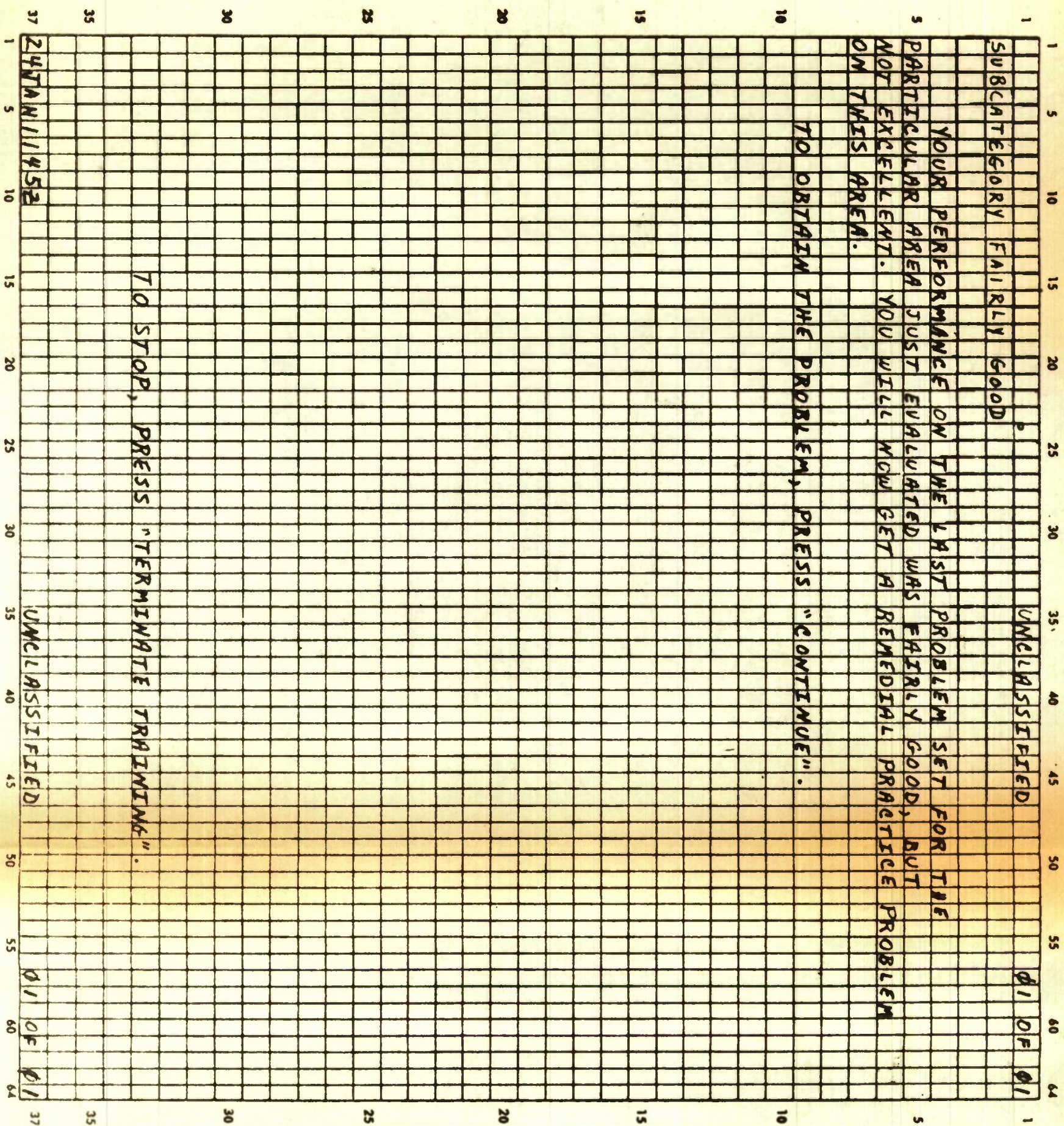


Figure 3-30. Subcategory.
POOR (● cue) - Q24



PURPOSE: to advise the trainee that his performance was average on a subcategory for which he will now get a remedial sequence, and start him on this sequence.

Figure 3-31. Subcategory AVERAGE (a cue) - Q25



PURPOSE: to advise the trainee that his performance was fairly good, but not excellent, on a subcategory for which he will now get a remedial practice problem, and start him on this problem.

Figure 3-32. Subcategory FAIRLY GOOD (a cue) - Q26

to advise the trainee that his answer to a remedial practice problem was incorrect and he must take a remedial sequence on the appropriate subcategory, and start him on this sequence.

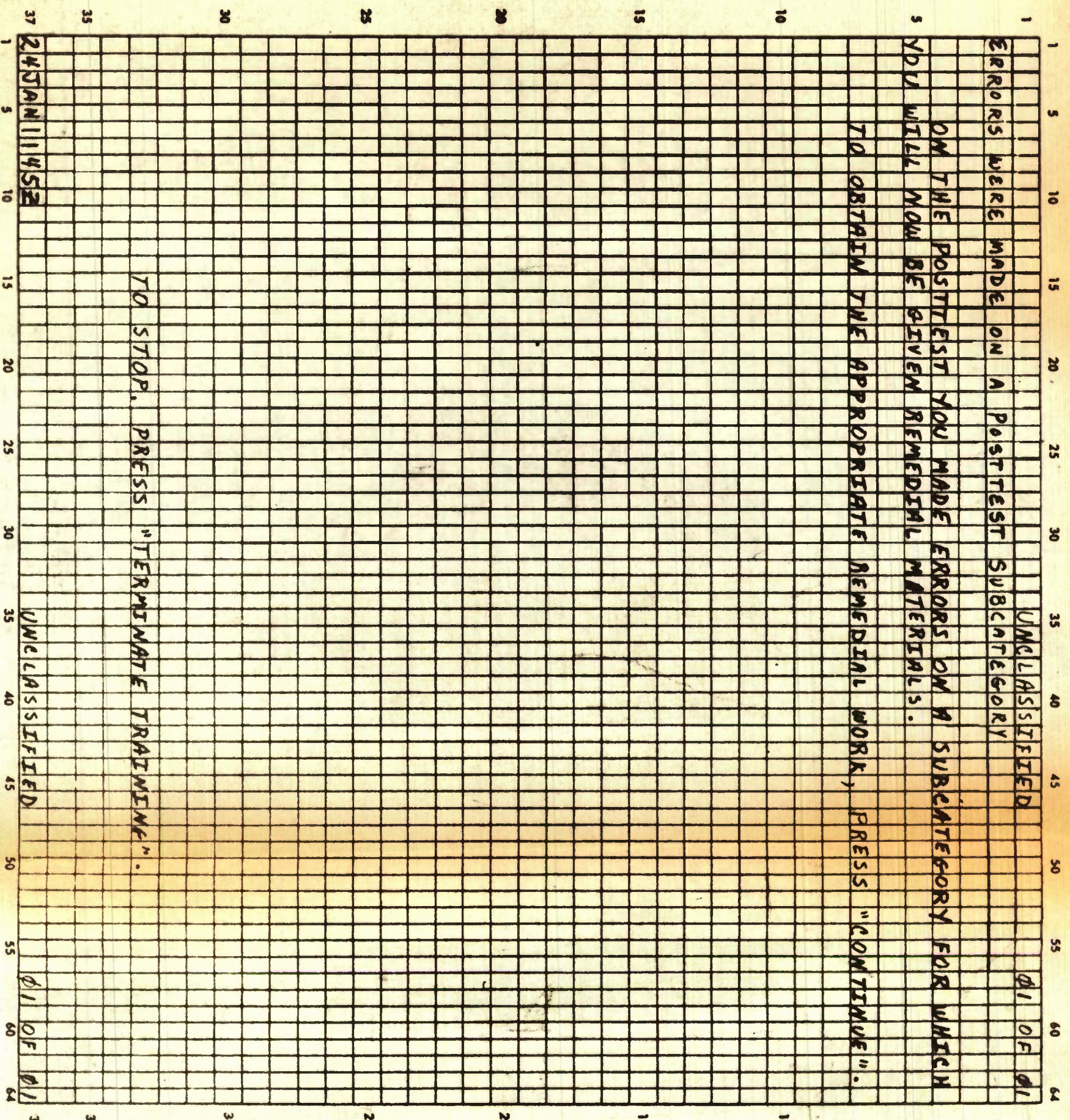
NUMBER TO THE PRACTICE PROBLEM WAS INCLUDED
IN THIS SET OF MATERIALS, PRESS "CONT.
TO STOP, PRESS "TERMINATE TRAINING"

Figure 3-33. Incorrect Answer to a Practice Problem (a cue) - Q27

PURPOSE: to indicate the procedure that will be used for taking the posttest and start the trainee on this test.

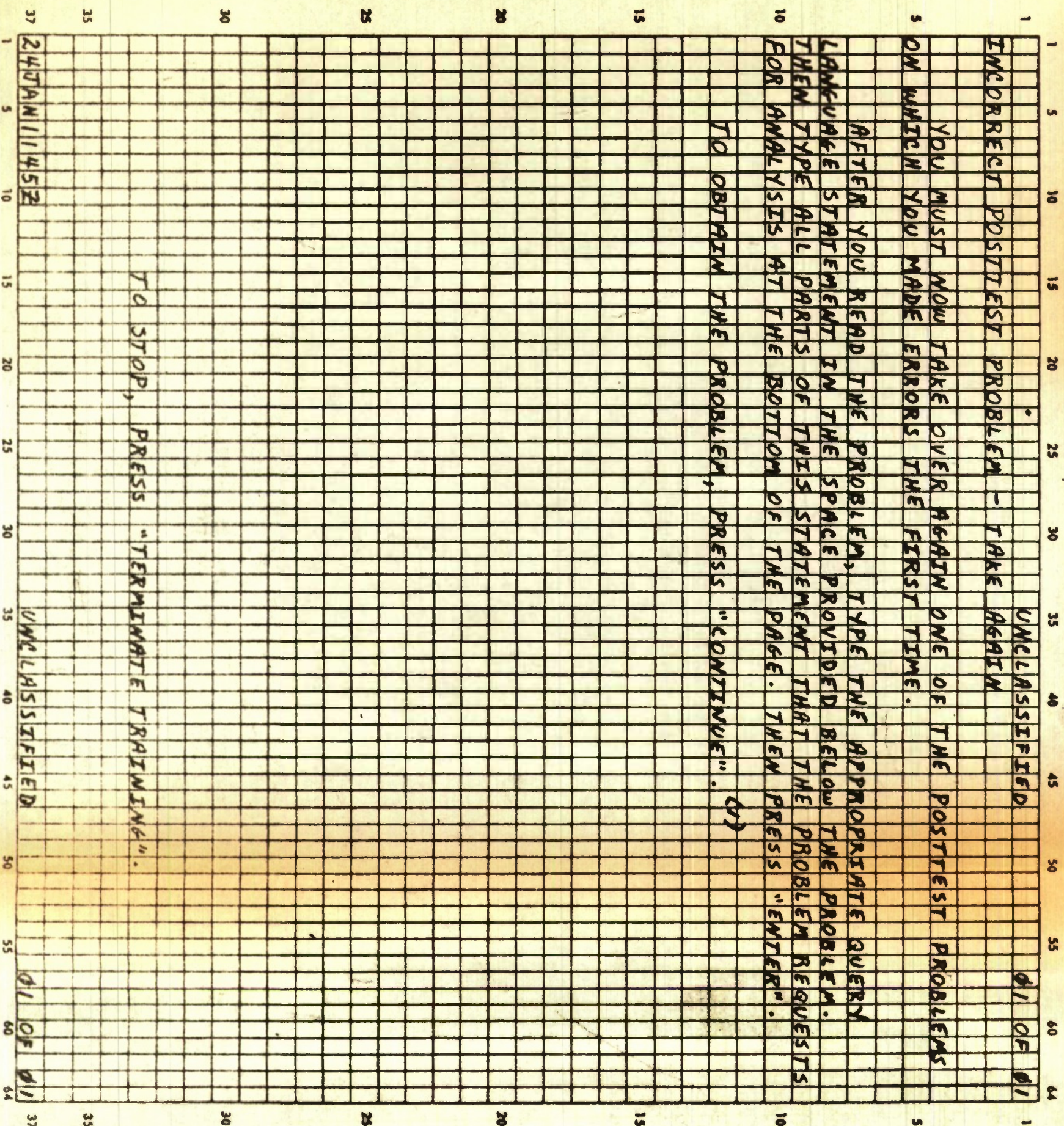
1	5	10	15	20	25	30	35	40	45	50	55	60	64		
1	INSTRUCTIONS FOR POSTTEST										UNCLASSIFIED				Q1 OF Q1
5	YOU HAVE COMPLETED ALL OF THE TRAINING SETS. YOU WILL NOW GET A SET OF PROBLEMS TO EVALUATE YOUR PROFICIENCY ON ALL AREAS OF QUERY LANGUAGE COVERED BY THIS COURSE.														
10	WHEN YOU HAVE COMPLETED ALL OF THE PROBLEMS IN THIS TEST SET, YOU WILL BE GIVEN REMEDIAL MATERIALS ON THE AREAS IN WHICH YOU MAKE ERRORS. THEN YOU WILL TAKE OVER AGAIN THE PROBLEMS THAT YOU MISSED THE FIRST TIME.														
15	AFTER YOU READ EACH PROBLEM, TYPE THE APPROPRIATE QUERY LANGUAGE STATEMENT IN THE SPACE PROVIDED BELOW THE PROBLEM. THEN TYPE THOSE PARTS OF THE STATEMENT THAT THE PROBLEM REQUESTS AT THE BOTTOM OF THE PAGE. THEN PRESS "ENTER".														
20	TO OBTAIN THE FIRST PROBLEM, PRESS "CONTINUE".														
25															
30															
35	TO STOP, PRESS "TERMINATE TRAINING".														
37	24 JAN 11 4 52										UNCLASSIFIED				Q1 OF Q1

Figure 3-34. Instructions for Taking Posttest (a cue) - Q28



PURPOSE: to advise the trainee that he will now get remedial materials on a subcategory for which he made errors on the posttest, and start him on these materials.

Figure 3-35. Errors Were Made on a Posttest Subcategory (a cue) - Q29

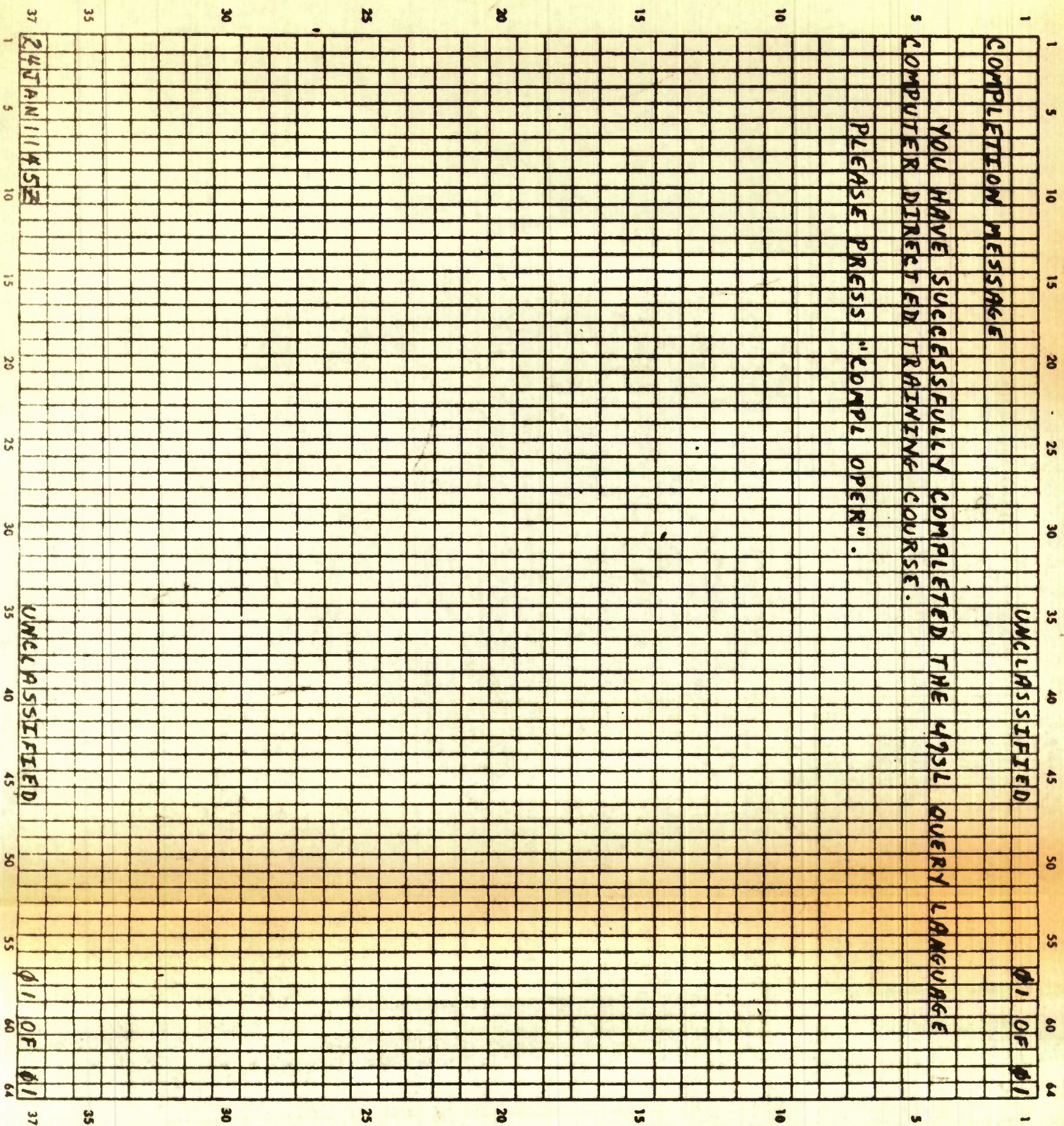


PURPOSE: to advise the trainee that he must take over again a posttest problem that he answered incorrectly on the first try, and start him on the appropriate problem.

FOOTNOTES:

- 1) "CONTINUE" will present the next posttest problem that was missed on the first try (for which the trainee has not already had two tries), a Q11.

Figure 3-36. Incorrect Posttest Problem -- Take Again (a cue) - Q30

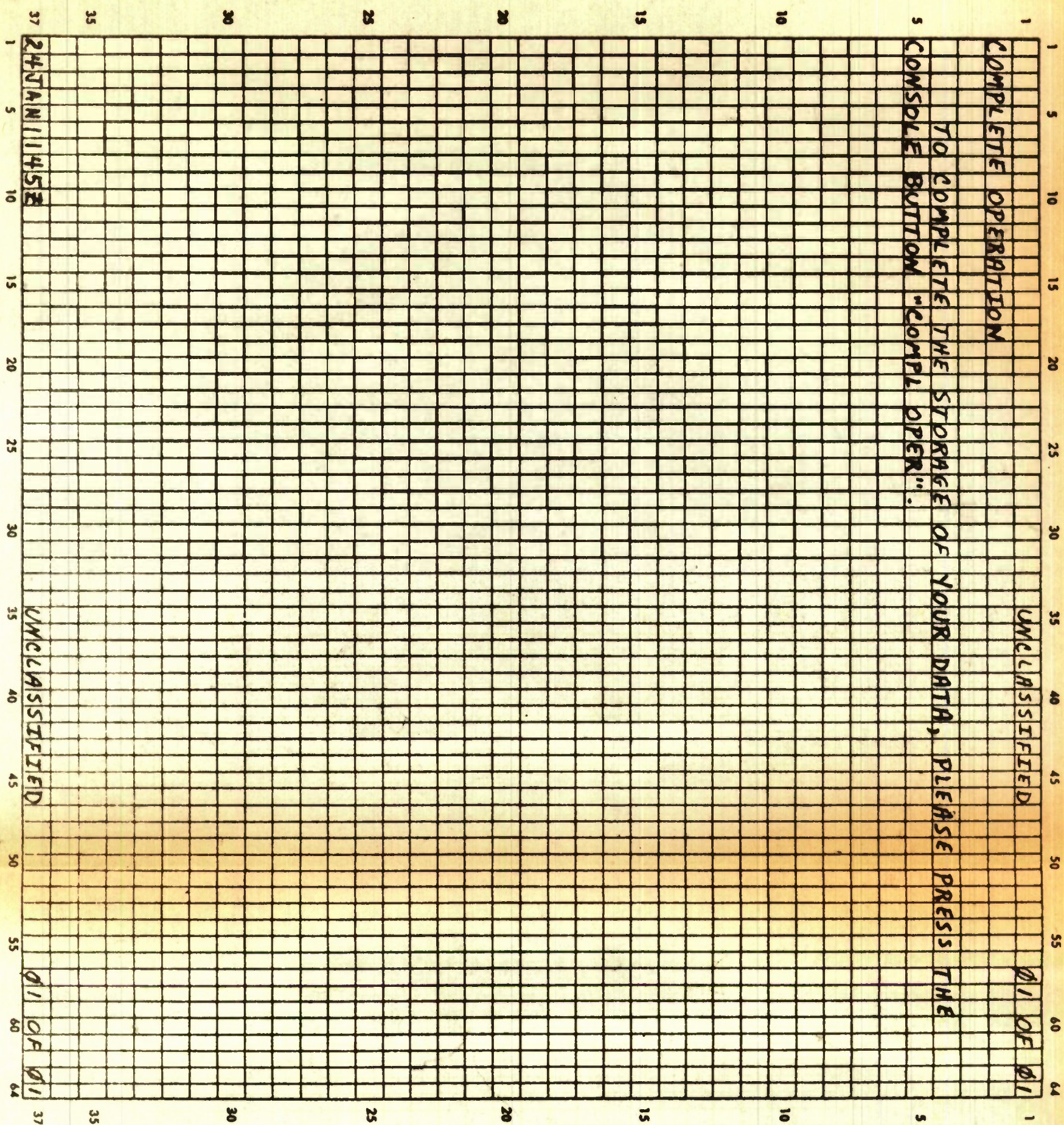


PURPOSE: to advise the trainee that he has successfully completed the 473L QL Computer Directed Training Program, and get him to press "TERMINATE TRAINING" to stop work on the computer.

FOOTNOTES:

- 1) "COMPL OPER" will complete the storage of data for the trainee and, at this time, the computer will update the summary record and make a Printout (#2) of the trainee's data.

Figure 3-37. Completion Message (a cue) - Q31



PURPOSE: to complete the storage of data.

Figure 3-38. Complete
Operation (a cue) - Q32

PURPOSE: to provide a message to the trainee that the computer directed training tape will be required before he can commence his training.

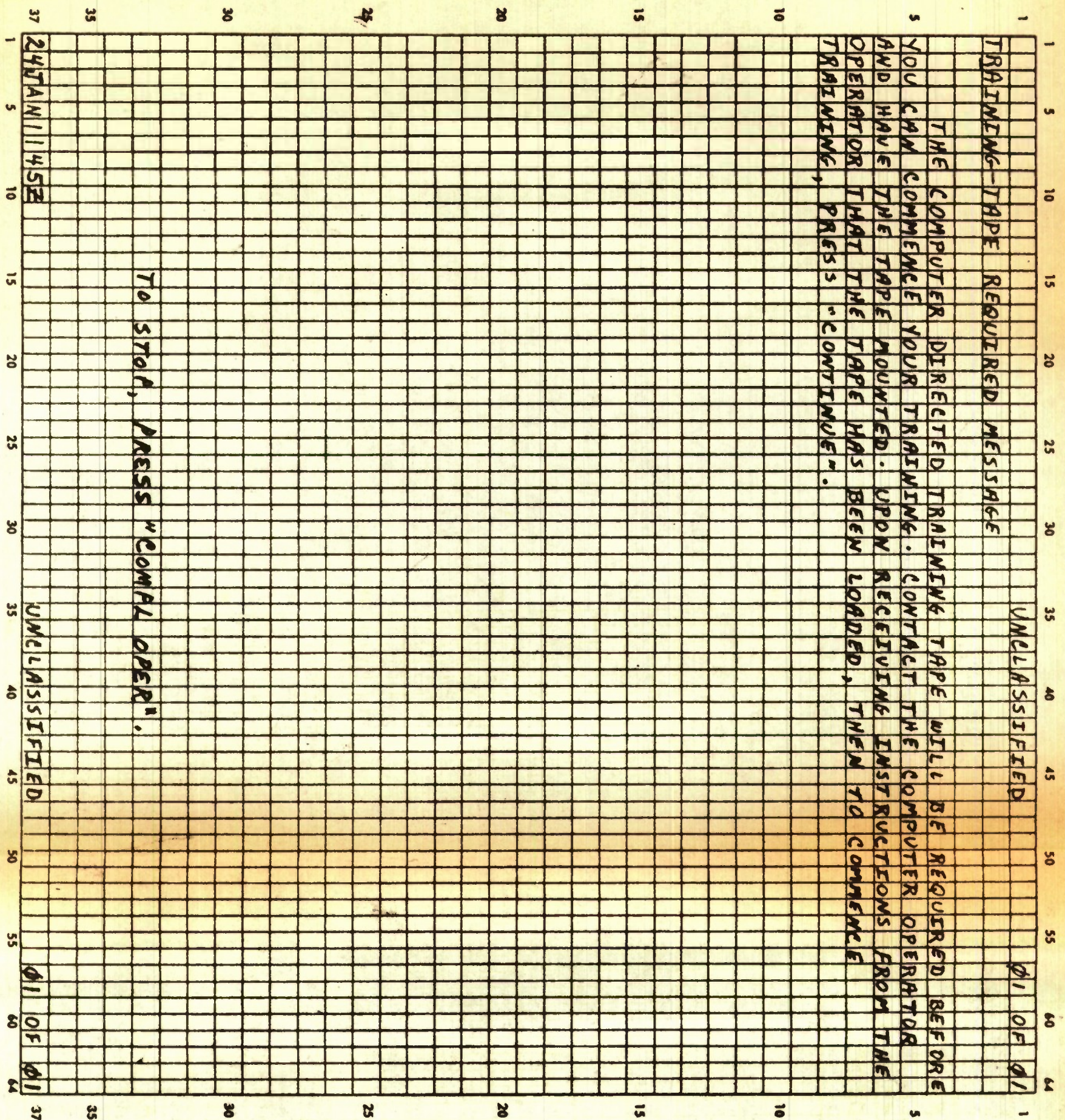


Figure 3-39. Training Tape Required Message (a cue) - Q33

UPDATE FEEDBACK MESSAGE

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THE UPDATING OF THE COMPUTER DIRECTED TRAINING MATERIALS
THAT YOU REQUESTED HAS BEEN COMPLETED.

IF YOU WISH TO CONTINUE, PRESS "ENTER".
IF YOU WISH TO TERMINATE, PRESS "COMPL OPER".

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SUMMARY DATA FOR ALL TRAINEES (1)

SUMMARY DATA FOR ALL TRAINEES

TOTAL NO TRAINEES WHO HAVE COMPLETED THE PROGRAM: _____

TOTAL NO TRAINEES STILL IN PROGRESS: _____

AVERAGE TIME TO COMPLETE THE PROGRAM: (2) _____

GROUP-A

GROUP-B

AVERAGE PERCENT ERROR ON THE PROGRAM (3) _____

GROUP-A

GROUP-B

(EXCLUDING THE POSTTEST)

AVERAGE PERCENT ERROR ON THE POSTTEST

GROUP-A

GROUP-B

FIRST-TRY

FINAL-TRY (4)

AVERAGE PERCENT ERROR ON EACH SUBCAT OVER ALL PY SETS EXCLUDING POSTTEST (A,B) AND ON POSTTEST (ALL TRAINEES)

S#	A	B	TST	S#	A	B	TST	S#	A	B	TST	S#	A	B	TST
1	—	—	—	26	—	—	—	51	—	—	—	76	—	—	—
2	—	—	—	27	—	—	—	52	—	—	—	77	—	—	—
3	—	—	—	28	—	—	—	53	—	—	—	78	—	—	—
4	—	—	—	29	—	—	—	54	—	—	—	79	—	—	—
5	—	—	—	30	—	—	—	55	—	—	—	80	—	—	—
6	—	—	—	31	—	—	—	56	—	—	—	81	—	—	—
7	—	—	—	32	—	—	—	57	—	—	—	82	—	—	—
8	—	—	—	33	—	—	—	58	—	—	—	83	—	—	—
9	—	—	—	34	—	—	—	59	—	—	—	84	—	—	—
10	—	—	—	35	—	—	—	60	—	—	—	85	—	—	—
11	—	—	—	36	—	—	—	61	—	—	—	86	—	—	—
12	—	—	—	37	—	—	—	62	—	—	—	87	—	—	—

27	13	—	—	—	—	38	—	—	—	—	63	—	—	—	88	—	—	—	113	—	—	—
28	14	—	—	—	—	39	—	—	—	—	64	—	—	—	89	—	—	—	114	—	—	—
29	15	—	—	—	—	40	—	—	—	—	65	—	—	—	90	—	—	—	115	—	—	—
30	16	—	—	—	—	41	—	—	—	—	66	—	—	—	91	—	—	—	116	—	—	—
31	17	—	—	—	—	42	—	—	—	—	67	—	—	—	92	—	—	—	117	—	—	—
32	18	—	—	—	—	43	—	—	—	—	68	—	—	—	93	—	—	—	118	—	—	—
33	19	—	—	—	—	44	—	—	—	—	69	—	—	—	94	—	—	—	119	—	—	—
34	20	—	—	—	—	45	—	—	—	—	70	—	—	—	95	—	—	—	120	—	—	—
35	21	—	—	—	—	46	—	—	—	—	71	—	—	—	96	—	—	—	—	—	—	—
36	22	—	—	—	—	47	—	—	—	—	72	—	—	—	97	—	—	—	—	—	—	—
37	23	—	—	—	—	48	—	—	—	—	73	—	—	—	98	—	—	—	—	—	—	—
38	24	—	—	—	—	49	—	—	—	—	74	—	—	—	99	—	—	—	—	—	—	—
39	25	—	—	—	—	50	—	—	—	—	75	—	—	—	100	—	—	—	—	—	—	—
40																						
41																						
42																						
43																						
44																						
45																						
46																						
47																						
48																						
49																						
50																						
51																						
52																						

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INDIVIDUAL TRAINEE DATA (1)										UNCLASSIFIED										INDIVIDUAL TRAINEE DATA										Φ1 OF Φ1																													
NAME										PERCENT ERROR ON EACH PX SET										PERCENT ERROR																																							
SERIAL NUMBER										PX										PERCENT ERROR																																							
GROUP										1										2										3										4										5									
TRAINING TIME										2										3										4										5																			
AVERAGE PERCENT ERROR ON PROGRAM										(2)																																																	
PERCENT ERROR ON POSTTEST - FIRST TRY										(3)																																																	
FINAL-TRY																																																											
ERRORS ON EACH POSTTEST PROBLEM																																																											
# TRY(4) POSS-E(5) 1ST-TRY(6) 2ND-TRY(7)										# TRY POSS-E 1ST-TRY 2ND-TRY										# TRY POSS-E 1ST-TRY 2ND-TRY																																							
1										6										11										1																													
2										7										12										1																													
3										8										13										1																													
4										9										14										1																													
5										10										15										1																													
SUBCAT ERROR DATA AND FREE-CHOICE TALLY																																																											
S# TRG TEST(8) F-C(10)										S# TRG TEST F-C										S# TRG TEST F-C										S# TRG TEST F-C																													
1										31										61										91																													
2										32										62										92																													
3										33										63										93																													
4										34										64										94																													
5										35										65										95																													
6										36										66										96																													
7										37										67										97																													

INDIVIDUAL TRAINEE DATA

UNCLASSIFIED

INDIVIDUAL TRAINEE DATA

$$\frac{\phi_2 \text{ of } \phi_3}{\phi_2, \phi_3 \text{ of } \phi_3}$$

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SEQUENCE OF REMEDIAL MATERIALS FOR Y SETS AND PRESENTATIONS OF FREE-CHOICE INDEX
(1)

(1) XXXXX

[illegible]

Figure 3-42. Line Printer
Printout of Individual Trainee's
Data - P/O 2 (sheets 02 & 03 of
03; lines 1-26)

XNNN (1)

TRAINEE: LAST NAME: _____

FIRST NAME: _____

MIDDLE INITIAL: _____

TRAINEE'S ANSWER TO THIS PRACTICE EXERCISE: (LINES 9 - 20) (2)

→
→
→

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Ø1 OF Ø1

Figure 3-43. Line Printer
Printout of Each Practice
Exercise Answer by Each Trainee
- P/O 3 (sheet Ø1 of Ø1)

NAME (1)

TRAINEE: LAST NAME: _____

FIRST NAME: _____

MIDDLE INITIAL: _____

TRAINEE'S FREE-FORM ANSWER TO THIS POSTTEST PROBLEM: (LINES 9 - 16) (2)

THE Q1 PARTS REQUESTED FOR ANALYSIS - TRAINEE'S ANSWER: (LINES 18 - 25) (3)

UNCLASSIFIED

UNCLASSIFIED

Q1 OF Q1

Q1 OF Q1

(Footnotes relating to the Printouts appear on the following pages)

3.3 Footnotes for Printouts

GENERAL NOTE: The footnote numbers specified in parentheses on each printout would not actually appear on the displayed cue or printout; these are specified now only to reference the appropriate footnotes for each printout.

3.3.1 Footnotes for P/O 1 - Line Printer Printout of Summary Data for All Trainees

GENERAL NOTE: Although underlines are used here to indicate where data can be filled in, until data is actually available for a particular entry, nothing will be typed in the available space.

- 1) This printout gives summary data for all trainees who have completed the 473L QL CDT Program.
- 2) Time will have a four-digit numerical value: the first two digits will indicate hours and the last two digits will indicate minutes.
- 3) The average percent error on the program given here will not include error data from the Posttest. This percent error will be determined by errors on the PY problem sets only (it will not include error data from the small number of PX sets).
- 4) If a trainee makes no mistakes on a posttest problem for the first try, his error tally for that problem (which is added to his error tally for the posttest) is zero for both the first-try tally and the second-try tally; otherwise, the first-try tally is the number of actual errors on the first-try and likewise, the second-try tally is the number of actual errors on the second try.
- 5) Average percent error for Group A trainees on each subcategory (over all PY sets except the Posttest).
- 6) Average percent error for Group B trainees on each subcategory (over all PY sets except the Posttest).
- 7) Average percent error over the posttest for all trainees on each subcategory.

3.3.2 Footnotes for P/O 2 - Line Printer Printout of Individual Trainee's Data

GENERAL NOTE: Although underlines are used here to indicate where data can be filled in, until data is actually available for a particular entry, nothing will be typed in the available space.

Footnotes for Sheet 1:

- 1) This printout can be obtained from the computer with entries made for available data, for all trainees who have not yet completed the program. It is not available for proficiency maintenance trainees. When a trainee completes the program, the summary data are updated, a printout is made of his final data on this printout and then his individual data are no longer stored by the computer.
- 2) This is the average percent error over all of the PY problem sets except for the posttest.
- 3) If a trainee makes no mistakes on a posttest problem for the first try, his error tally for that problem (which is added to his error tally for the posttest) is zero for both the first-try tally and the second-try tally; otherwise, the first-try tally is the number of actual errors on the first-try and likewise, the second-try tally is the number of actual errors on the second try.
- 4) The number of times the trainee took each posttest problem.
- 5) The possible number of errors on each posttest problem.
- 6) The number of errors the trainee made on each problem on the first try.
- 7) The number of errors the trainee made on each problem on the second try. If a trainee makes no mistakes on a posttest problem for the first try, his error tally for that problem (which is added to his error tally for the posttest) is zero for both the first-try tally and the second-try tally; otherwise, the first-try tally is the number of actual errors on the first-try and likewise, the second-try tally is the number of actual errors on the second try.

- 8) Average percent error on each subcategory over all PY problems sets except posttest; right justified with leading zeros.
- 9) Average percent error on each subcategory for the first try over all post-test problems; right-justified with leading zeros.
- 10) A running tally of the number of times each subcategory was chosen for free-choice review; right justified.

Footnotes for Sheet 2 and Sheet 3:

- 1) Each code for a remedial path-point will be a five-character alphanumeric code: for forced remedial materials, the first character will be alphabetic and will indicate the Y set for the last PY (it will not be a set code for each remedial set he is sent to); the next three characters will be numeric and will indicate the subcategory number for which the trainee was taking remedial materials at this point; the last character will be numeric and will indicate the trainee's rating on the subcategory. A special five-character code of some sort (e.g., XXXXX) will indicate each time the trainee got the index for free-choice review (Q21 or Q4), regardless of whether he got remedial materials or not (but XXXXX will be recorded only once for any set).

Path codes can occupy the spaces underlined, starting in columns 1-5 and going down the page to line 52; then in columns 7-11 down the page, etc. (with a column of spaces between each column of codes), first on sheet 2 and then on sheet 3, for a maximum of 1034 codes on sheet 2 and 46 codes on sheet 3. (This allows for the recording of 1080 codes, or 89% of the total possible for any trainee, which is 1215.)

3.3.3 Footnotes for P/O 3 - Automatic Line Printer Printout of Each Practice Exercise Answer by Each Trainee

GENERAL NOTE: Although underlines are used here to indicate where data can be filled in, until data is actually available for a particular entry, nothing will be typed in the available space.

- 1) XNNN represents the alphanumeric code for a set and step number. The first character is alphabetic and represents the set; the next three characters are numeric and represent the step number. All cues within a set are numbered sequentially, regardless of type.
- 2) The material given on lines 9-20 will be the material typed by the trainee on lines 21-32 of the Q19 having the same XNNN code (see note 1 above).

3.3.4 Footnotes for P/O 4 - Automatic Line Printer Printout of Each Posttest Problem Answer by Each Trainee

GENERAL NOTE: Although underlines are used here to indicate where data can be filled in, until data is actually available for a particular entry, nothing will be typed in the available space.

- 1) XNNN represents the alphanumeric code for a set and step number. The first character is alphabetic and represents the set; the next three characters are numeric and represent the step number. All cues within a set are numbered sequentially, regardless of type.
- 2) The material given on lines 9-16 will be the material typed by the trainee on lines 17-24 of the Q11 having the same XNNN code (see note 1 above).
- 3) The material given on lines 18-25 will be the material typed by the trainee on lines 26-33 of the Q11 having the same XNNN code (see note 1 above).

Appendix A

PROCEDURAL FLOW

Figure A-1 presents the procedural flow for this capability. The flow diagram symbols, symbol connections, and codes used in the symbols are explained in Tables A-1 through A-3. Examples of typical flow situations are also included in these tables.

Table A-1. Procedural Flow Diagram Symbols (Sheet 1 of 2)

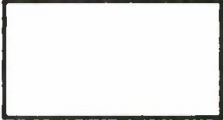





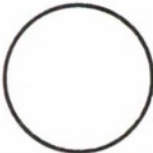
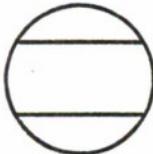
Symbol	Symbol Name	Symbol Meaning
	Integrated Console Indicator	Indicates that the specified indicator is lighted. The associated key may be pressed at this point.
	Flow Arrow	Indicates direction of flow.
	Connector	Indicates continuation of flow from one place to another on the same sheet or on another sheet of the diagram.
	Decision Point	Indicates the point in flow at which a program decision exists.
	Program	Indicates an action to be accomplished by a program.
	Operator	Indicates the actions to be performed by the operator.
	Cue	Indicates that a cue statement is generated at this point in the program.
	Display (ET or MC)	Indicates that an electronic typewriter (ET) or multi-color (MC) display is generated at this point in the operation.

Table A-1. Procedural Flow Diagram Symbols (Sheet 2 of 2)

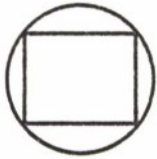
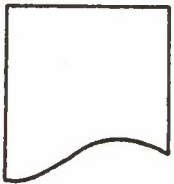
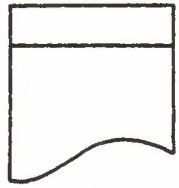

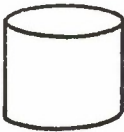
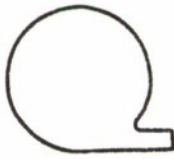

Symbol	Symbol Name	Symbol Meaning
	Priority Message	Indicates that a priority display is generated at this point in the operation.
	Line Printer Printout	Indicates that the line printer produces hard copy at this point in the operation.
	Console Printer Printout	Indicates that the console printer produces hard copy at this point in the operation.
	Punch Card	Indicates utilization of punched card for either input or output.
	Machine File	Indicates the machine file in which the data is stored.
	Magnetic Tape	Indicates utilization of magnetic tape for either input or output.
	Magnetic Tape (Manual Mounting)	Indicates that tape is being mounted by the operator.

Table A-2. Procedural Flow Diagram Symbol Connections (Sheet 1 of 2)


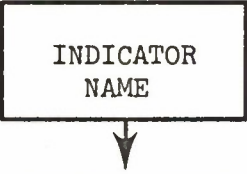





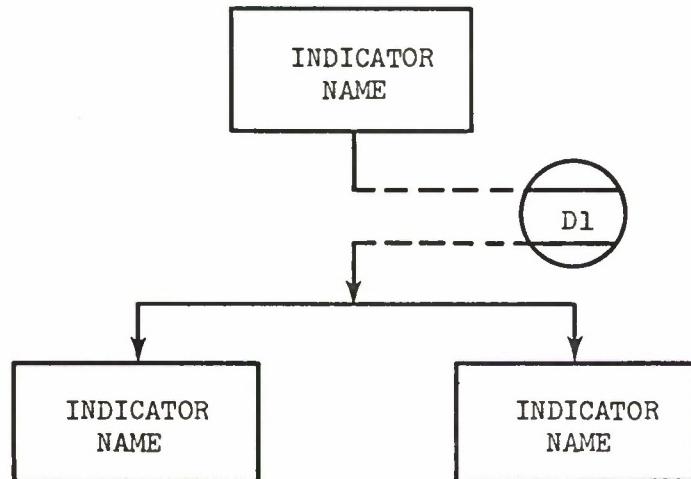
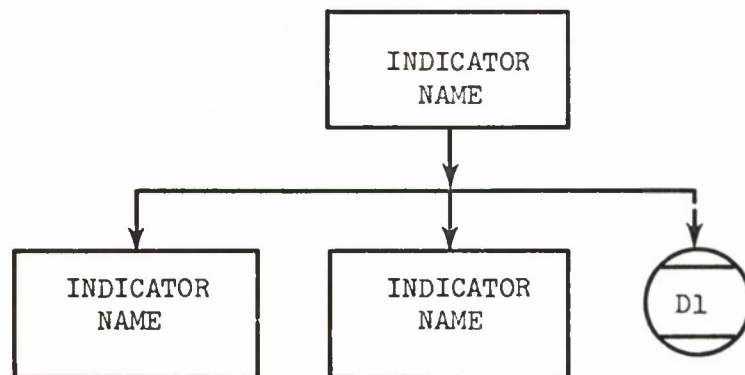
Symbol Connection	Symbol Meaning
	The specified overlay indicator is lighted. One or more of these boxes may appear as one level of options.
	When the operator presses the specified process step key, he must follow the arrow leaving the box.
	The arrow entering the cue symbol indicates that Q3 has appeared on the ET screen.
	When the operator presses the ENTER push-button, he must follow the arrow leaving the cue symbol. This symbol implies <u>internal error checking</u> .
	The arrow entering the display or printout symbol means that a printout (e.g., P/O 2) or display (e.g., D6) is received at this point.
	The arrow coming into the connector symbol means that the flow continues, beginning with the specified connector (N) on Sheet 2.
	The arrow leaving the connector symbol signifies that the flow from the specified connector (N) continues here.

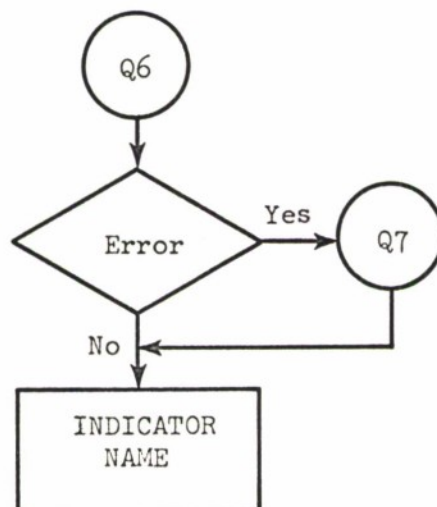
Table A-2. Procedural Flow Diagram Symbol Connections (Sheet 2 of 2)



Display D1 must be generated prior to receiving the next option level.



The next option level is received immediately and display D1 is being generated.



An error has occurred that requires a special error cue format.

Table A-3. Procedural Flow Diagram Symbol Codes

Code	Code Meaning
Q	Used with a number to identify the cue message that appears on the ET screen.
D	Used with a number to identify the display message containing operational data that appears on the ET screen.
MC	Used with a number to identify the display message containing operational data that appears on the MC screen.
P/O	Used with a number to identify the printout (hard-copy output) that appears on the line printer.
CP/O	Used with a number to identify the printout (hard-copy output) that appears on the console printer.
()	Placed around any of the above codes to indicate that the corresponding cue, display, or printout is generated by another capability and, therefore, is described in the operational specification for that capability.

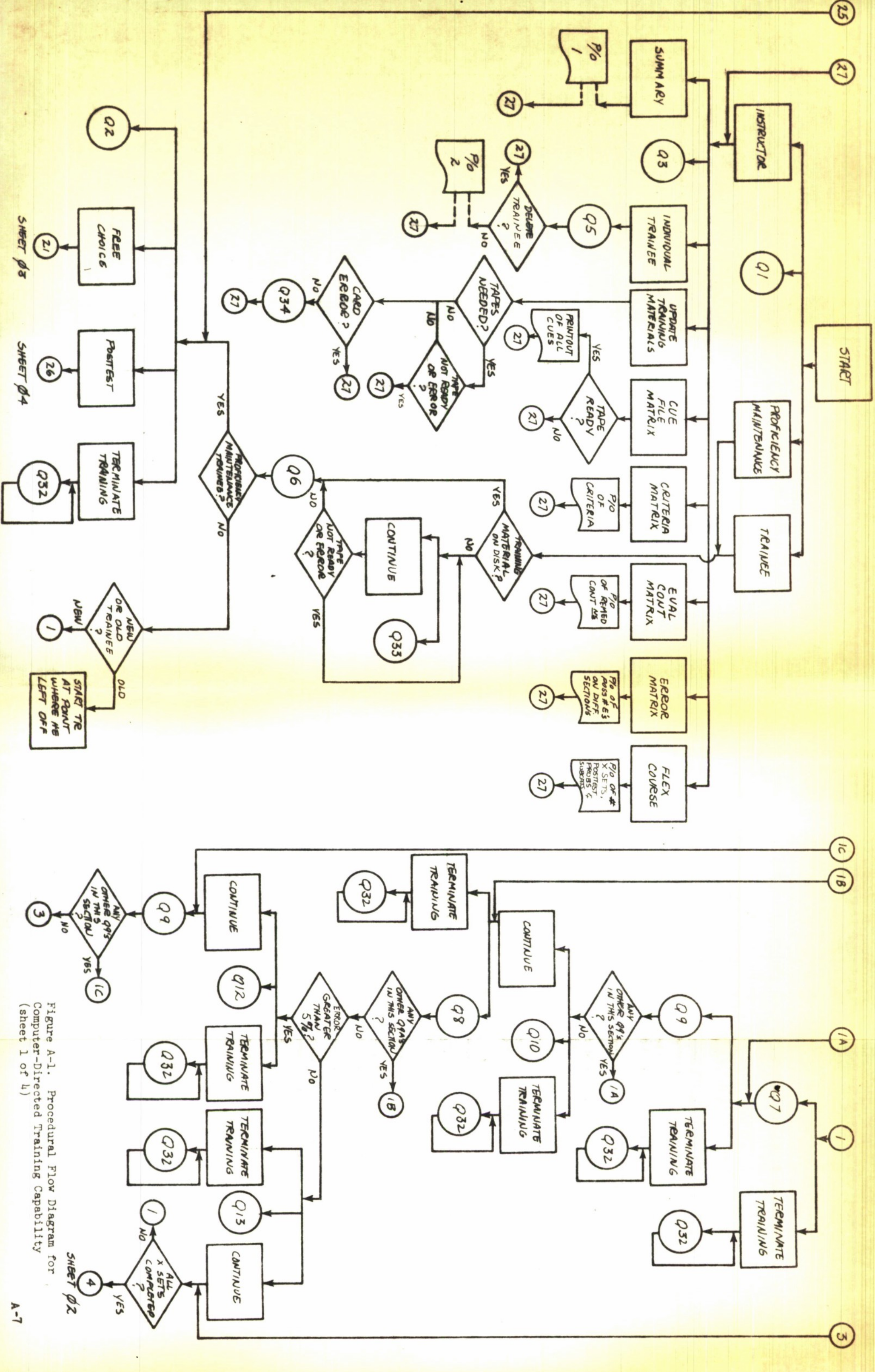


Figure A-1. Procedural Flow Diagram for Computer-Directed Training Capability (sheet 1 of 4)

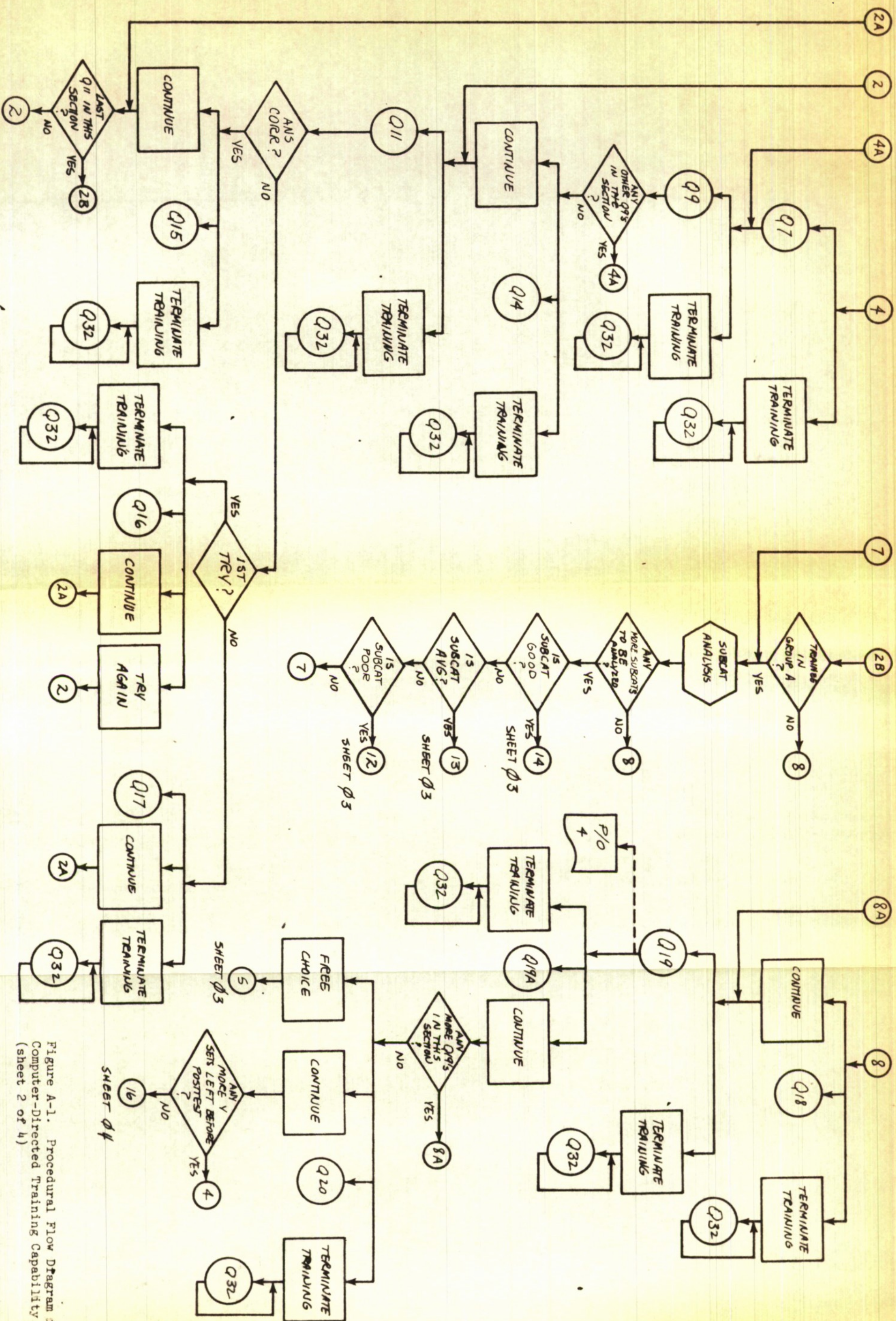


Figure A-1. Procedural Flow Diagram for Computer-Directed Training Capability (sheet 2 of 4)

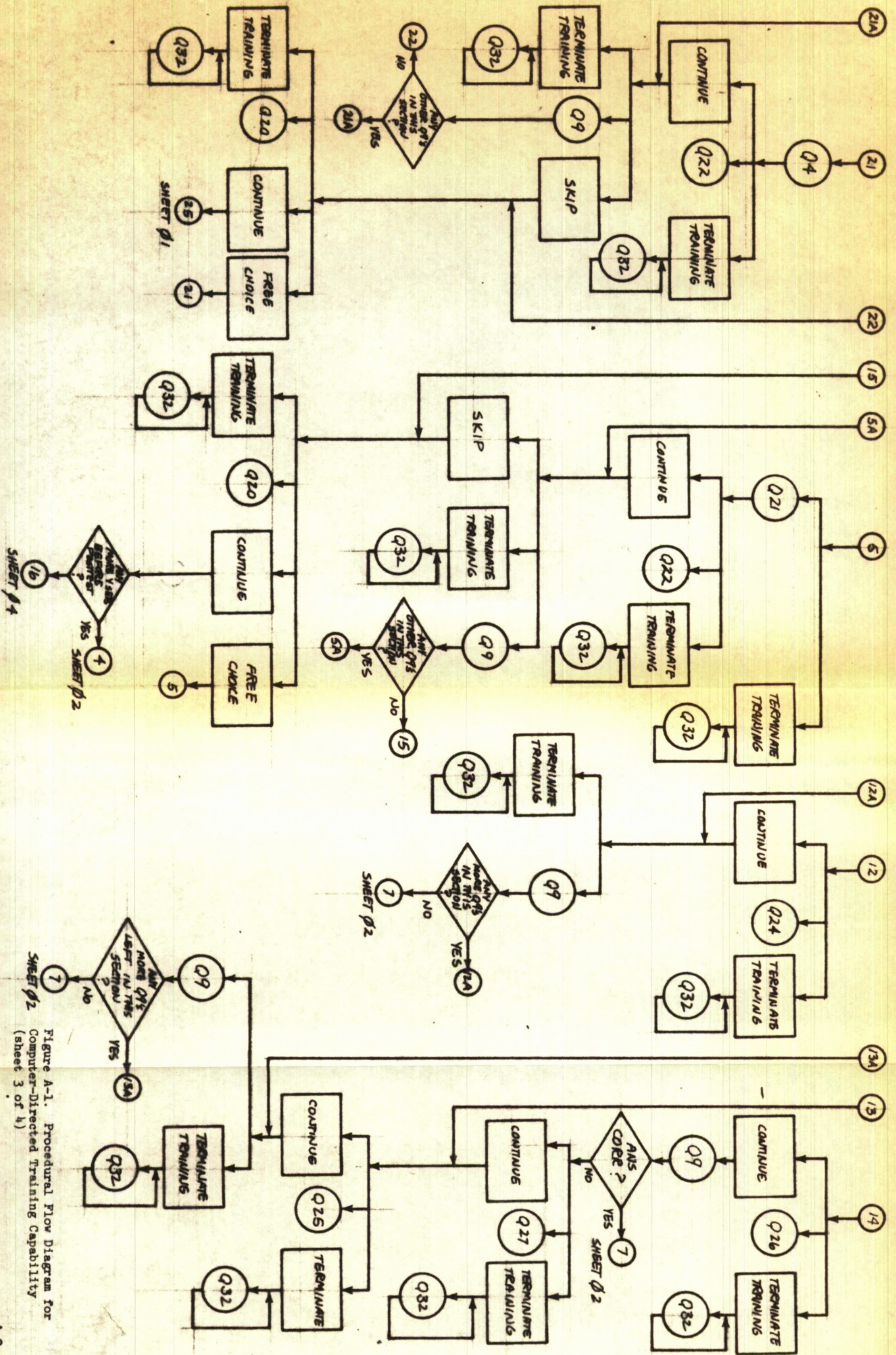
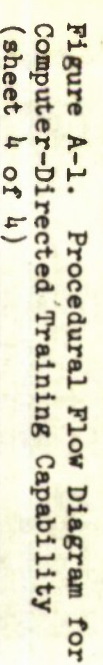


Figure A-1. Procedural Flow Diagram for
Computer-Directed Training Capability
(sheet 3 of 4)



Appendix B

GLOSSARY^{*}

This appendix is used to define major new terms, unique to this capability.

CUMULATIVE SET

A Y SET of LEARNING CUES in which the LY SECTION reviews the materials covered in the INDEPENDENT SETS that followed the last CUMULATIVE SET, and the PY SECTION tests all of the materials covered after the last CUMULATIVE SET. For the Computer Directed Training program, there are 6 CUMULATIVE Y SETS.

FORCED REMEDIAL SEQUENCE

A sequence excerpted from an LY (or LX) SECTION for remedial work, after excess errors on a PY (or PX) SECTION.

FRAME NUMBERS

See STEP NUMBERS in this Glossary.

FREE-CHOICE REVIEW

REVIEW sequence(s) excerpted from one or more of the LY SECTIONS previously taken by the TRAINEE. FREE-CHOICE REVIEW sequences are available at the end of each Y SET, but they are presented only if the TRAINEE indicates he wants them. At the end of each Y SET, a FREE-CHOICE REVIEW sequence will be available for each SUBCATEGORY that was associated with an answer for the problems in the last PY SECTION. There are two indices for the trainee to use in selecting a SUBCATEGORY for which he wants FREE-CHOICE REVIEW: the Index for Free-Choice Review for Trainees Who Have Not Completed the Program (Q21); and the Index for Free-Choice Review for Trainees Who Have Completed the Program (Q4).

FREE-FORM PRACTICE EXERCISES

The presentation, on successive cues, of each problem and its correct answer in a PEY SECTION.

^{*} In this Glossary, any terms or phrases typed in all capital letters are defined within this Glossary, with the exception of any QL words used in the definitions.

GENERAL CATEGORY

A major topic of instruction related to Intermediate Query Language, Model II, that is covered by the LEARNING CUES in the Computer Directed Training course. The GENERAL CATEGORIES include the elements of QL plus some additional major topics. Examples of GENERAL CATEGORIES are: Program Indicator, File Indicators, Conjunctions, the Qualifier, Modifiers, etc. For a complete list of the GENERAL CATEGORIES to be used, see columns 1-19 on the Index for Free-Choice Review for Trainees Who Have Completed the Program (Q4). GENERAL CATEGORIES are provided on Q4 to aid the operator in searching for the SUBCATEGORY on which he wants to take FREE-CHOICE REVIEW.

GROUP A TRAINEES

TRAINEES who will be forced, after each PY SECTION, to take REMEDIAL SEQUENCES on the SUBCATEGORIES in which they made excessive errors. GROUP A TRAINEES constitute one group in the experimental comparison of two different training conditions in the use of the Computer Directed Training program. (See GROUP B TRAINEES in this Glossary.)

GROUP B TRAINEES

TRAINEES who will not be forced, after each PY SECTION, to take REMEDIAL SEQUENCES on the SUBCATEGORIES in which they made excessive errors. GROUP B TRAINEES constitute one group in the experimental comparison of two different training conditions in the use of the Computer Directed Training program. (See GROUP A TRAINEES in this Glossary.)

INDEPENDENT SET

A Y SET of LEARNING CUES, in which the LY SECTION teaches new materials, and the PY SECTION tests only the materials covered by the LY SECTION in the same SET. For the Computer Directed Training program, there are 13 INDEPENDENT Y SETS.

INSTRUCTIONAL CUES

Cues that are used primarily to instruct the operator in the proper procedure for making a transition from one point in the training sequence to another; INSTRUCTIONAL CUES usually indicate the available options for continuing (see

Table 3-1 for a description of all overlay options), and in some cases they provide feedback to a TRAINEE regarding his performance on the last cue or series of cues. The INSTRUCTIONAL CUES include all cues except Q8's, Q9's, Q11's, Q19's, and Q19A's, which are the LEARNING CUES.

INSTRUCTOR

A person authorized to obtain data on one or more of the TRAINEES taking the program and/or to modify the training materials.

LEARNING CUES

Cues used to provide training and evaluation for the desired criterion behaviors for the Computer Directed Training program, e.g., how to write a SUM function. The LEARNING CUES include the following cues, identified by code: Q8's, Q9's, Q11's, Q19's, and Q19A's.

LX SECTION

A division of LEARNING CUES within an X SET, used primarily for training. An LX SECTION includes 2 subsections: a) the basic training sequence; and b) the REVIEW sequence that reviews the materials taught in the basic sequence.

LY SECTION

A division of LEARNING CUES within a Y SET, used primarily for training. An LY SECTION includes 3 subsections: a) the basic training sequence, called a TEXT sequence; b) the sequence that reviews the information taught by the TEXT sequence: called the REVIEW sequence; and, c) a sequence that requires the development of QL statements for specified data retrieval problems: called a PRACTICE PROBLEM sequence.

PEY SECTION

A division of LEARNING CUES within each of the Y SETS except the POSTTEST SET, which gives the TRAINEE practice in developing complete QL statements for specified problems, with feedback to the TRAINEE indicating the correct QL statement for each problem.

POSTTEST SET

A Y SET in which the LY SECTION reviews the materials covered throughout all of the other Y SETS, and the PY SECTION is the posttest, which tests all materials covered throughout all of the other Y SETS.

PRACTICE PROBLEMS

A subsection within an LY SECTION which emphasizes the development of QL statements for specified data retrieval problems. A designated problem within this subsection may be used, after a PY SECTION, as a FORCED REMEDIAL problem on a particular SUBCATEGORY, for a TRAINEE whose RATING was GOOD, but not EXCELLENT, on that SUBCATEGORY in the last PY SECTION.

PRETEST SETS

The X SETS.

PROBLEM CUES

CUES that require computer error-analysis of the trainee's answer(s). Any CUE used in a PX or PY SECTION, or as a FORCED REMEDIAL PRACTICE PROBLEM, is a PROBLEM CUE.

PROFICIENCY MAINTENANCE TRAINEE

A person who has previously completed the Computer Directed Training program and who now wants 1) to take the posttest in order to make a self-evaluation of his proficiency and/or 2) to take a REMEDIAL SEQUENCE on some topic.

PX SECTION

A division of LEARNING CUES within an X SET, used primarily for evaluation of the TRAINEE's proficiency on the preceding LX SECTION.

PY SECTION

A division of LEARNING CUES within a Y SET, used primarily for evaluation of the TRAINEE's proficiency in one or more of the preceding LY SECTIONS.

RATING

An indication of a TRAINEE's performance level on a SUBCATEGORY. After each PY SECTION, a TRAINEE is given a RATING on each SUBCATEGORY that was available for analysis on that PY (i.e., for each SUBCATEGORY that was associated with at least one of the answers for the problems in that PY). Possible RATINGS are EXCELLENT, GOOD, AVERAGE, and POOR. The criteria to be used for these RATINGS are shown in Table 2-1, for an INDEPENDENT PY and for a CUMULATIVE PY.

REMEDIAL SEQUENCE

A sequence excerpted from an LY (or LX) SECTION, used for FORCED REMEDIAL work, after excess errors on a PY (or PX) SECTION; or (only when excerpted from an LY SECTION), for FREE-CHOICE REVIEW on a SUBCATEGORY.

REVIEW

1. A subsection of LEARNING CUES within an LX SECTION that reviews the materials taught in the initial series of cues. A designated sequence within this subsection may be used as a REMEDIAL SEQUENCE after excess errors on a PX SECTION.

2. A subsection of LEARNING CUES within an LY SECTION that reviews the materials taught in the TEXT subsection. A designated sequence within this subsection may be used:

A) After a PY SECTION, as a FORCED REMEDIAL sequence on a particular SUBCATEGORY, for a TRAINEE whose RATING was AVERAGE on that SUBCATEGORY in the last PY SECTION, or whose RATING was initially GOOD but the TRAINEE missed the PRACTICE PROBLEM assigned.

B) For FREE-CHOICE REVIEW on a SUBCATEGORY used in the last PY.

SECTION

A division of LEARNING CUES within a SET. 1) X SETS are divided into two major SECTIONS: a) the LX SECTION, used for training; and b) the PX SECTION, used for evaluation. 2) Y SETS are divided into three major SECTIONS: a) the LY SECTION, used for training; b) the PY SECTION, used for evaluation; and c) the PEY SECTION, used for practice in developing complete QL statements.

SET

A logical division of the LEARNING CUES totalling 25 and separated into four categories: 1) 5 PRETEST SETS; 2) 13 INDEPENDENT SETS; 3) 6 CUMULATIVE SETS; and 4) 1 POSTTEST SET. Non-QL LEARNING CUES are divided into X SETS; QL LEARNING CUES are divided into Y SETS. In general, each SET covers a different major area of instruction, e.g., the use of the console; GCD; MIN/MAX, etc. Each SET contains a number of SECTIONS, having different training and evaluation functions for the same major area of instruction.

STEP

A training term used to indicate a unit of learning material; for this program, each STEP is presented as a separate cue.

STEP NUMBERS

The sequential numbers assigned to the LEARNING CUES within each SET. For each SET, the STEP NUMBERS begin with 1 and continue in sequential order to the last CUE in that SET.

SUBCATEGORY

A topical subdivision of a GENERAL CATEGORY, representing a topic related to a specific element or expression or word or format that is used in Intermediate Query Language, Model II, and covered by the Computer Directed Training course. Examples of SUBCATEGORIES are type-3 attributes, availability designations, COUNT, format of GCD attributes in the qualifier, SUM-control attributes, format for a MIN/MAX attribute in the qualifier, format for MIN/MAX values, formats for sorts, etc. For a complete list of the SUBCATEGORIES to be used, see columns 27-63 on the Index for Free-Choice Review for Trainees Who Have Completed the Program (Q4). In each PY SECTION, each answer to a problem has an associated SUBCATEGORY, identified for programmer use. A TRAINEE's errors are tallied for each SUBCATEGORY on a PY and a TRAINEE is required to take FORCED REMEDIAL work appropriate to the SUBCATEGORIES in which he made excessive errors. In addition, SUBCATEGORIES are presented on Q21 and Q4 so that a trainee may select one or more SUBCATEGORIES for FREE-CHOICE REVIEW.

TEXT

A subsection of LEARNING CUES within an LY SECTION that provides basic training for the topic(s) covered in that LY. A designated sequence within this subsection may be used after a PY SECTION as a FORCED REMEDIAL sequence on a particular SUBCATEGORY, for a TRAINEE whose RATING was POOR on that SUBCATEGORY in the last PY SECTION.

TRAINEE

A person who has not yet completed the Computer Directed Training course in Intermediate Query Language, Model II.

X SET

One of the first 5 SETS of LEARNING CUES used by the CDT program, i.e., one of the PRETEST SETS. The X SETS are used to provide a basic foundation for the course but do not teach QL itself. The X SETS cover: a) the use of the instructional materials in the CDT program; b) the use of the console and the CDT overlay; c) a basic introduction to the files and structure of QL; and, d) the use of the manuals covering the QL data base and system vocabulary and the CDT Exhibit Book.

Y SET

A SET of LEARNING CUES that provides training and evaluation in the use of Intermediate QL, Model II.

Appendix C

OPERATOR AIDS

The following documents may aid the operator in using this capability and the system.

a. 473L-OS-31: Operational System Description, Model II -- Describes the overall purpose of the Model II, 473L System, and shows the relationship and interactions of the operational and support capabilities.

b. 473L-OS-40: Operational Specification for Query Language, Model II -- Describes the Query Language and its use to manipulate and retrieve data from the system data base.

c. 473L-OS-41: Operational Specification for Data Control, Model II -- Describes the procedures necessary to establish and maintain the system data files, and specifies the data base structure, data format, and data acquisition sources. The appendix contains the System Vocabulary Guide, which describes the legal values for all system dictionaries and lists all system attributes.

d. 473L-OS-43: Operational Specification for the Integrated Console, Model II -- Describes, in detail, the procedures for data retrieval and Integrated Console Operation that are common to all capabilities. It also includes a description of the MC Display capabilities.

Appendix D
CUE ESTIMATES

Cue #	Est. # to be Used	# of pages for each cue
Q1	1	1
Q2	1	1
Q3	1	1
Q4	1	6
Q5	1	1
Q6	1	1
Q7	1	1
Q8	50 (PX's)	1
Q9	1940 (LX's & LY's)	1
Q10	1	1
Q11	140 ¹ (INDEP, CUM, & POSTTEST PY's)	1
Q12	1	1
Q13	1	1
Q14	1	1
Q15	1	1
Q16	1	1
Q17	1	1
Q18	1	1
Q19	125 (PEY's - FREE-FORM PRACTICE EXERCISES)	1
Q19A	125 (answers for the Q19's)	1
Q20	1	1
Q21	1	1 page for INDEP LY's & 2 pages for CUM LY's
Q22	1	1
Q23	1	1
Q24	1	1
Q25	1	1
Q26	1	1
Q27	1	1
Q28	1	1
Q29	1	1
Q30	1	1
Q31	1	1
Q32	1	1
Q33	1	1
Q34	1	1

¹These 140 Q11's are the only cues for which answers must be stored separately; for Q8's, answers appear on the next Q8 cue, and likewise for Q9's; and, for Q19's answers appear on the following cue, a Q19A.

Appendix E

INTEGRATED CONSOLE CONTROL PANEL DIAGRAM

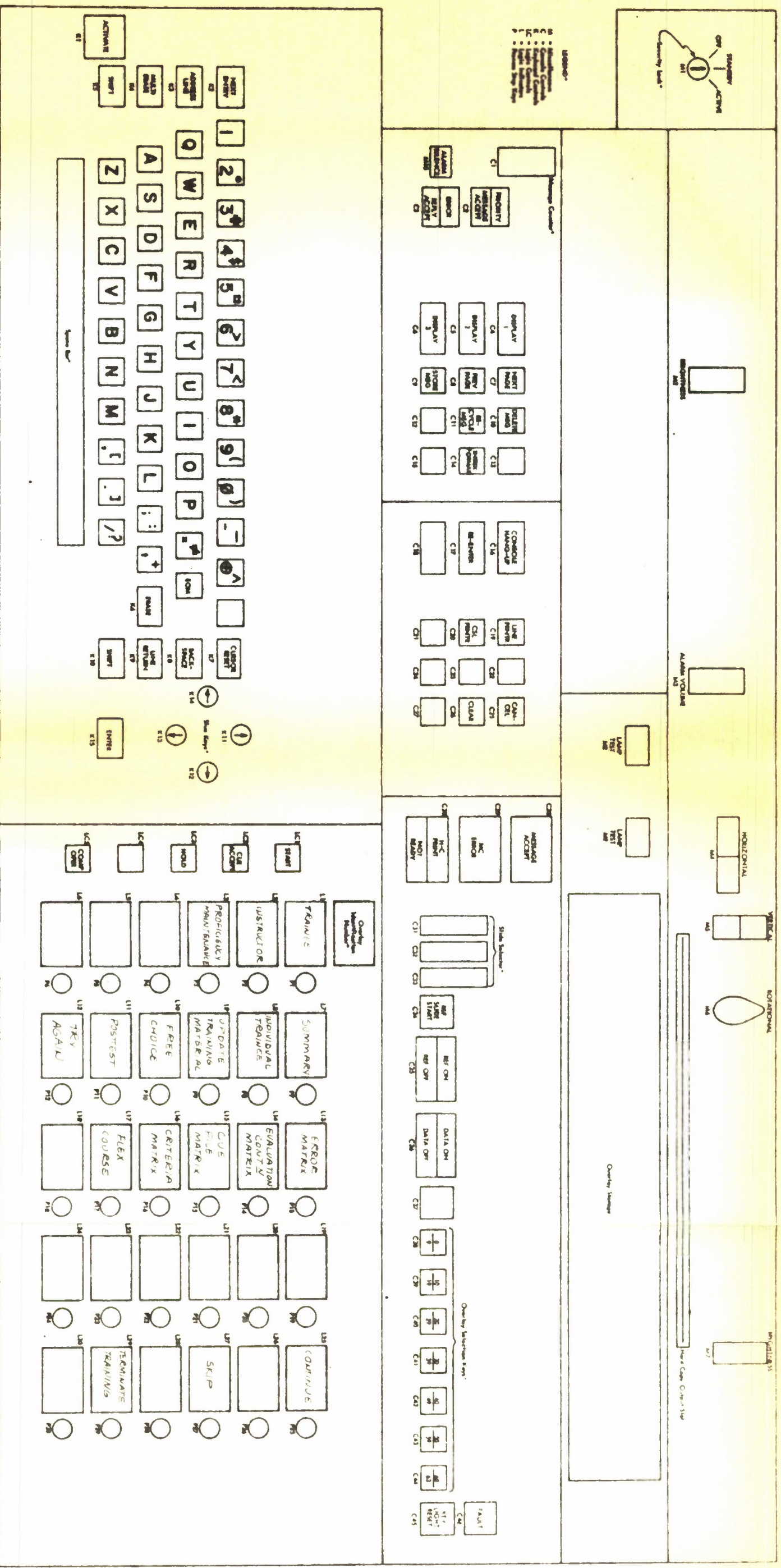


Figure E-1. Integrated Console Control Panel Diagram

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R&D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) American Institutes for Research Pittsburgh, Pennsylvania		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
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4. DESCRIPTIVE NOTES (Type of report and inclusive dates) None			
5. AUTHOR(S) (Last name, first name, initial) Clapp, Doris J. Shettel, Harris H. Mayer, Sylvia R.			
6. REPORT DATE February 1966	7a. TOTAL NO. OF PAGES 174	7b. NO. OF REFS 4	
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b. PROJECT NO. 7682			
c. TASK: 768204	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) None		
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10. AVAILABILITY/LIMITATION NOTICES This document is subject to special export controls and each transmittal to foreign governments or foreign nationals may be made only with prior approval of Hq ESD (ESTI).			
11. SUPPLEMENTARY NOTES None		12. SPONSORING MILITARY ACTIVITY Decision Sciences Laboratory, Electronic Systems Division, Air Force Systems Command, USAF, L. G. Hanscom Field, Bedford, Mass.	
13. ABSTRACT <p>This Operational Specification describes the project Computer-Directed Training program which permits active on-console training of personnel in the writing and processing the Intermediate Query Language, Model II, statements in System 473L. This capability can be used to provide initial training and proficiency maintenance. The files, programs, and processes of the program and a sample computer-trainee interaction are detailed. General flow charts for a possible computer program implementing the specifications are provided, designed for the Librascope L-3055. The capability can be adapted to provide training in the use of other System 473L capabilities.</p>			

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Automated Training Subsystem Information Systems Self Instruction Course Programed Learning OJT Man-Computer Communication Computer Directed Instruction						

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